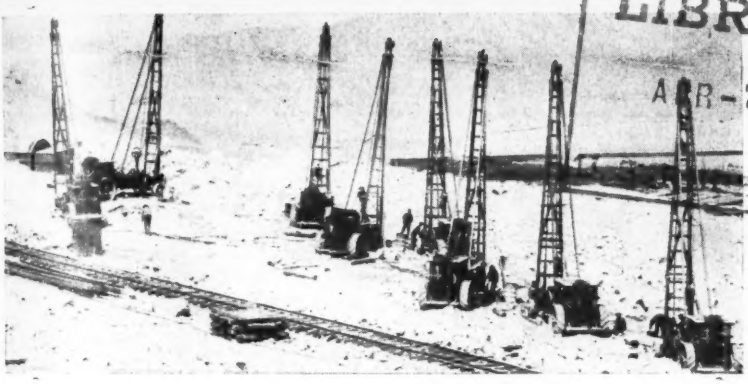
Pit and Quarry
SAND • GRAVEL • STONE
HANDLING • CRUSHING • SCREENING • WASHING

LIBRARY
APR-7 1925



When the Big Boys Buy

DOWN in South America, perched 9,000 feet above sea level, at a distance 125 miles from seaboard is a wonderful open pit mining operation—wonderful in size and wonderful in operating efficiency.

In April, 1917, one No. 14 Cyclone Electric Traction Blast Hole Drill was placed on this job. In the eight years that have intervened, this old pioneer drill, doing its own sales work, has seen 44 of its brothers placed in operation alongside of it, all purchased as a result of steady and consistent performance.

The illustration above shows one bench of the mine with its complement of Cyclone Drills.

You may be sure that the men responsible for the economical operation of this great mine would not trust their production to Cyclone Drills unless they knew that this trust would not be betrayed.

Write for the new edition of our 100-page book, "Big Blast Hole Drills."

THE SANDERSON-CYCLONE DRILL CO.
Orrville, Ohio

Eastern and Export Office
30 Church St., New York

March 15, 1925

Index to Advertisers - - - - - Page 37
Table of Contents - - - - - - - Page 39

Circulation 7,600

The New Whitcomb 4-Ton Gasoline Locomotive Model "U. F.-4" is a real light duty locomotive.

It is in no sense a make-shift job, but is built upon a solid cast iron chassis along the same general lines as the large "Whitcomb." It is designed with particular attention to the convenience and safety of the operator.

The "U. F.-4" has an average draw bar pull of 1600 pounds, and is a haulage tool that is capable of doing any job within its rating.

Whitcomb Locomotives are built in all sizes and types to suit every condition.

Write for bulletins.

Offices in Principal Cities

THE GEO. D. WHITCOMB COMPANY

ROCHELLE, ILLINOIS

Representatives:

The General Supply Company of Canada, Ltd.

Ottawa Montreal Toronto North Bay Moncton

Machinery Corporation, Apartado 76 B. Mexico City, D. F., Mexico.

GASOLINE-STORAGE BATTERY-ELECTRIC

WHITCOMB LOCOMOTIVES

Pit and Quarry

A Semi-Monthly Publication for Producers and Manufacturers of Sand, Gravel, Stone, Cement, Gypsum, Lime and Other Non-Metallic Minerals.

VOL. 9 CHICAGO, ILL., MARCH 15, 1925 NO. 12

CONTENTS

Conferring Authority..... 41
Pass It On..... 42
Shields Now Associate Editor..... 42
Trinity Completes Plant..... 43
Imports Indicate Europe's Recovery..... 46
Wisconsin Compensation Bill..... 46
Waste Heat Boilers..... 47
Balf Company Covers Many Angles..... 49
A Business Analysis and Forecast..... 55
Tax Cut Seen in 1925 Surplus..... 55
More For Year-Round Building..... 56
Power For Digging..... 57
Reynolds Company Producing Silica Sand 59
Public Liability Insurance..... 67
Car Loading Gain..... 70
Conley Company Operates Two Plants.... 71
Freight Traffic in 1924..... 74
The Coal Situation..... 74
Power Transmission 75
Texas Highways Grow..... 77
Building Figures Look Good..... 79
New Incorporations..... 81
Declares Coal Has No Real Competition.. 80
Michigan Safety Conference..... 80
Trade Notes, Catalogs, New Equipment. 83-86

Pass it on

..... *President*

..... *Vice-Pres.*

..... *Secretary*

..... *Treasurer*

..... *Gen. Mgr.*

..... *Sales Mgr.*

..... *Traffic Mgr.*

..... *Engineer*

..... *Supt.*

..... *Foreman*

..... *Purch. Agent*

COMPLETE SERVICE PUBLISHING CO.
Rand-McNally Bldg., Chicago, Ill.

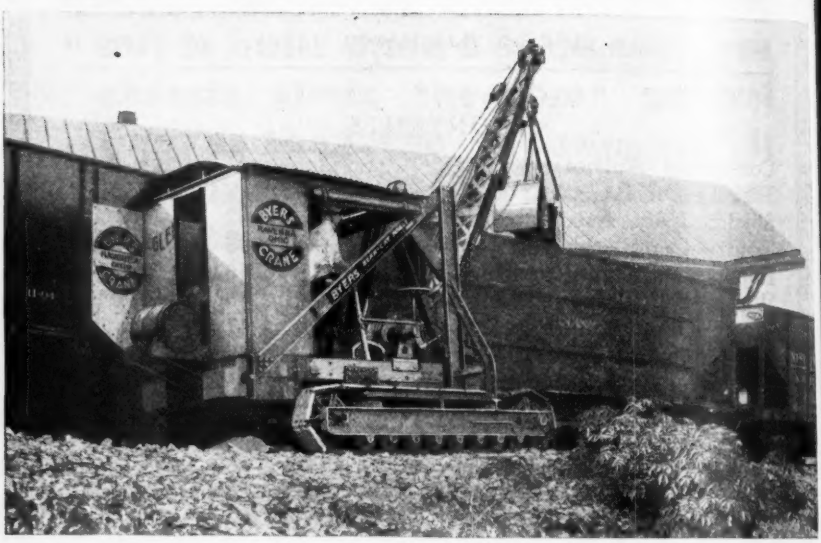
Publishers of
PIT AND QUARRY and Pit and Quarry HANDBOOK

HARRY W. BAUMGARTNER
President
W. A. WILSON
Advertising Manager
S. E. COLE, Eastern Representative
90 West Street, New York
Ph. Rector 4154

HAROLD W. MUNDAY
Editor

Associate Editors
GEORGE B. MASSEY
H. C. SHIELDS
ROBERT N. RISSER

BYERS



10 to 12 Cars a Day—Total Cost $15.23

For fast clamshell work you can't beat a Bear cat. It snuggles right up to a gondola on its full caterpillars, the half circle swing permitting the most effective operation and thorough cleaning of the cars.

With 28-foot boom and ½-yard bucket it moves materials at a speed equal to much larger machines. The Bear Cat is just the right size to be thoroughly practical and economical. If it were any larger it wouldn't have the speed—smaller, it would lack the capacity. A one man machine, the average operating cost is only $15.23 per day including operator's salary.

The Bear Cat handles all the attachments shown here, as well as dragline and others applicable to clamshell boom. It has made wonderful records at digging with skimmer, ditcher, etc. A thoroughly high grade machine in every respect, it stands up under the severest usage and earns its cost many times over.

THE BYERS MACHINE CO., 430 Sycamore St., Ravenna, Ohio

Builders of Truckrane, Full Circle Crane, etc. Sales and Service throughout the country.

BEAR CAT

THE ALL-PURPOSE CRANE

Pit and Quarry

Vol. 9 Chicago, Ill., March 15, 1925 No. 12

Conferring Authority

CHIEF among the requisites of a good executive is the ability to place authority and responsibility. The strength of his organization is determined largely by his skill in selecting his men and in conferring authority upon them. His greatest chance for failure as an executive is in confusing the idea of delegated authority, with that of conferred authority. When an executive delegates authority, he admits that he must keep his hands on the reins; he has no men who are capable of assuming responsibility. He is in reality admitting that he is not skillful in finding reliable men or that he has an organization that does not attract strong men. He is a weak executive. His test of strength is in the kind of organization he has built up. If he has so constructed it that he has a staff of men in whose hands he can place authority, he is a strong executive. If he continues to handle a great mass of details, to do everything that is important himself and merely to delegate duties to others, he is weak.

Conferring authority and responsibility upon capable men is the wisest and most far reaching policy that can be adopted. Its advantages are obvious. Carefully selected men who are entrusted with power are certain to develop qualities which are invaluable to the organization. They acquire a loyalty and enthusiasm not unlike that which comes with ownership. They respond to the confidence that is placed in them and serve their company with earnestness and devotion. No man can stand still; he must go forward or backward. Men who are led to take responsibility go forward. The more they are made to feel that the responsibility is theirs and that they will be expected to build up their part of the organization, the more they will come through with initiative and energy.

The man with delegated authority is merely a tool. He is the assistant to somebody. It is his duty to carry out orders; to perform tasks set by someone else. There is no reason why he should have initiative or ideas since he is not expected to think or to act of his own accord. The organization makes no appeal to his loyalty; it offers no incentive for his ingenuity. A great latent capacity for accomplishment is wasted because his best effort has not been called into service. He has no authority, no responsibility. He is not held to account for results. He never experiences the thrill of satisfacion that comes when one has acted on his own initiative and has been successful. He never knows that wearying but satisfying strain of thinging out a situation and determining on a course of action. His is merely delegated authority. All the worries, all the thrills, all the exciting variations of the business are monopolized by the chief who thinks he is a great executive and who fails so utterly.

Some executives are more far sighted and up-to-date in their handling of the problem of machinery than in their handling of men. Convince the head of a business that his machinery is not of the best type to bring about maximum production and he will give heed. The best steam shovels, the latest type of engine, the most effective crushers are matters of vital importance to him. He sees the problem of up-to-date equipment in terms of dollars and cents. The problem of men is also one which calls for up-to-date methods. The term executive has been defined as the coordinating head of a self contained unit. Such an executive does not attempt to keep a direct hold on a great many details. There should be men chosen for certain parts of the business and upon them should be placed unqualified, not delegated, authority. They should be selected with the same care and foresight that goes into the selection of equipment.

Before the steam shovel is selected, it is challenged. It must have those points of superiority which convince the buyer that it is the best that can be secured for his purpose. Men for definite posts in the organization should be selected in the same way. Their abilities and powers are being purchased. After the shovel is bought it is used. Every day it is taxed to the limit of its power. The ingenuity and initiative of the men are often wasted. If they are utilized, the entire organization profits.

The executive who thus confers authority soon finds time for the real business of being an executive. He is free to study the field, to enter into the activities of the industry. He will find that he has powers which he has never before had time to develop. He is a stronger executive because he has created a stronger staff to carry out the policies which make his business a success.

Pass It On

EDITORIALLY PIT AND QUARRY is concerned with all vital problems in the non-metallic industries. It is our business to study the field, to ascertain what information will be of greatest use to our readers, and to offer that information in the most practical and usable form. If an expert can be found whose knowledge and experience qualify him to give the material, his services are secured. Every available resource is called into service in order that each issue may be valuable. Business and plant articles are divided into two general classes dealing with operating methods and with management problems. Technical articles are offered for the benefit of those who can be found in every plant who will make practical use of the scientific data which they contain. Specialists are constantly preparing these articles for our columns. All articles are intended for corporate officers, general managers, traffic executives, sales managers, engineers, superintendents and foremen.

It is our task to get the material to the plant; it is yours to see that it reaches the individuals who will make use of it. A copy of each issue of PIT AND QUARRY reaches every plant producing a non-metallic mineral. Someone goes through it first finding the articles which serve him best. Many of our readers tell us that they pass the book on to others in the organization who in turn keep it moving along the line. Some executives mark certain articles for the attention of some particular individual for whom they are of especial value. That is very gratifying to us; it is an incentive for greater effort and more persistent search for the material that is wanted.

With this issue we have instituted a new scheme that will serve as a convenience to those who thus desire to get a maximum amount of good from our articles. On the table of contents page there will be found a suggested list of executives in a model plant. This is so placed in tabular form that it will be easy to draw a line from the article indexed to the name of the position occupied by the person who should read it. This plan will aid those who have been getting PIT AND QUARRY into the hands of various persons in the organization, and it will also serve to remind others, after they have read it, to pass it on.

H. C. Shields Now Associate Editor

THE editorial department of PIT AND QUARRY has been enlarged to include Mr. H. C. Shields as associate editor. This is in accordance with our policy to bring to the non-metallic industries as a whole the best in management practice, operating methods and plant design through the medium of technical and business articles on selected subjects by qualified writers.

Mr. Shields has had twenty years experience in the cement industry from the management, financial and design angles, and his great wealth of information and experience will be available to the readers of PIT AND QUARRY for the first time. His articles will deal largely with the operating and engineering problems of the cement industry. He will also write some special articles on powdered coal.

Readers of PIT AND QUARRY are invited to send inquiries relating to operating problems to Mr. Shields care of PIT AND QUARRY.

Trinity Portland Cement Company Completes Fort Worth Plant

New 500,000 Barrel Cement Plant to Produce April First Increases the Total Annual Output to 2,000,000 Barrels

THE Trinity Portland Cement Company of Dallas, Texas, has completed the construction of a 500,000 barrel cement plant, located four miles north of Fort Worth, Texas, on the Santa Fe Railroad. This plant will be operated in conjunction with their plant now located at Eagle Ford, Texas, seven miles West of Dallas and, upon operation, it will give the Trinity Portland Cement Company an approximate output of 2,000,000 barrels of cement yearly. This increased production is somewhat in excess of the present demand for cement in this territory. The management, however, feel that they should be in position to take care of any abnormal demand from the trade. The capacity of the plant of the Trinity Portland Cement Company, located at Eagle Ford, has been practically doubled during the last three years and the annual capacity at this time is approximately 1,500,000 barrels.

Many improvements of major importance have been made during the past three years in order to increase plant capacity and, at the same time, manufacture quality cement in an efficient manner. Some of the improvements are the installation of a more efficient initial crushing system, also the installation of a Waste Heat System, which has been a great step forward. The company has also constructed a six bin Concrete Cement Storage of the silo type. This storage will hold 120,000 barrels of cement which, in addition to the old storage, they still retain, will give the Company an approximate storage of 180,000 barrels of cement. This additional storage adds much to the flexibility of operation, thereby greatly assisting in the reduction of manufacturing cost per barrel.

The quarry is located about 400 yards from the plant. The material at the quarry is handled by two Marion steam shovels, and is transported from quarry by two Vulcan saddle tank locomotives with 20 six-yard—standard gauge western side dump cars. Sanderson Cyclone drills are used for drilling blast holes. The Company is about to discontinue the use of steam shovels, blast hole drills and blasting powder, as they are installing two Stephens-Adamson excavators with approximate capacity of 1,500 tons of rock per day. These excavators will eliminate the need of blasting and steam shovels and at the same time deliver the rock to the cars of a size that will practically eliminate initial crushing costs, in addition to the elimination of all blasting costs. On account of the softness of the rock in the quarry of the Trinity Portland Cement Company, it is felt that the installation of this equipment will be a great success.

After leaving the quarry, the company has, as initial crushing equipment, one 36 by 60 feet Fairmont Roll Crusher, which is capable of handling approximately 250 tons of rock per hour. This company originally installed a number 9 gyratory crusher which was very efficient from an upkeep standpoint however, it was very deficient from a production standpoint on account of the character of raw material, which has a tendency to slip and ride, therefore, making necessary much labor in order to get the required production. The installation of the Fairmont crusher has been a distinct success. Material is taken from Fairmont crusher to number 7 Williams mill. Two 6 by 60 feet dryers, burning fuel oil, are used. Number 8 Krupp Ball Mills and 5 by 22 feet Gates Tube Mills do the raw grinding.

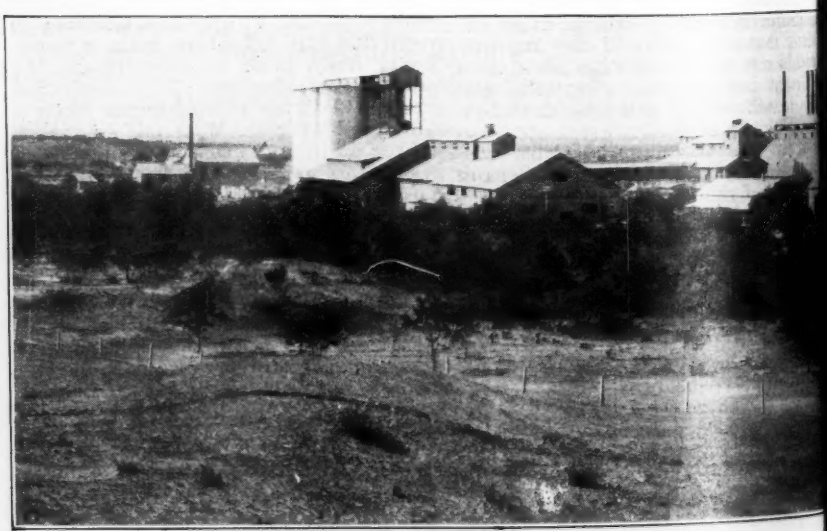
There are five kilns in the plant of the Trinity Portland Cement Company. Three of these kilns are 8 by 125 feet and two of the kilns are 10 feet in diameter for the first 50 feet and 8 feet in diameter for the balance of the 125 feet. The last two kilns have been changed from the 8 by 125 feet size during the last two years and the result has more than justified the expectations of the management, in that the increased production and fuel efficiency is far in excess of the smaller kilns.

Referring to waste heat installation previously mentioned, there is enough heat generated from the five kilns to develop power for the entire plant which has approximately 3,805 connected motor horsepower. The waste heat installation consists of three 1,000 H.P. Edgemoor waste heat boilers and one 600 H.P. oil and gas fired boiler, the latter being for emergency use only when the kilns are not in operation. The prime movers are one 2,500 kilowatt Curtis Vertical Turbine and one 4,000 kilowatt Allis-Chalmers Horizontal Turbine with Wheeler Condensers, Green Fuel Economizers and all auxiliaries. This company has been very successful in the operation of their waste heat boiler plant and have been able to produce power at a very low cost. As previously stated, this installation has been a great step forward and a decided success.

On the finish end of the mill, the company has seven 5 by 22 feet Gates Tube Mills for finish grinding and operate six Kent Mills for preliminary finish grinding. The operating manager, Mr. O. V. Bartholomew, has redesigned the Kent mills to some extent and made improvements whereby the operating efficiency of the Kent mills is very high. Owing to installation of metal liners and metal grinding mediums, the output of finish tube mills has been greatly increased. This company has made many improvements on the plant at Eagle Ford, Texas, in the past few years, which, together with experienced operators, should make this plant one of the most efficient in the United States from the standpoint of economical operation.

As previously stated, this company has purchased cement property at Fort Worth, Texas, approximately four miles north of the city comprising 600 acres. The limestone found on this property has been thoroughly tested by competent cement chemists and found to be of a very satisfactory nature for cement manufacture. This plant is now nearing completion and when completed should be a most compact and efficient unit. The engineers have arranged the layout and construction in such a manner that from an operating standpoint the production costs per barrel of cement should be as low, if not lower, than any other plant in the United States.

This plant will be operated on the wet process plan, burning fuel oil. The quarry is equipped with one 2½ yard Marion Steam Shovel and one 1½ yard Marion Steam Shovel. Sanderson Cyclone Drills will be used for blast hole drilling. The Woodford Electric Haulage System has been installed for the transportation of material from the quarry to the initial crusher. The initial crusher is a Williams Mammoth Hammer Mill, capable of handling 225 tons of material

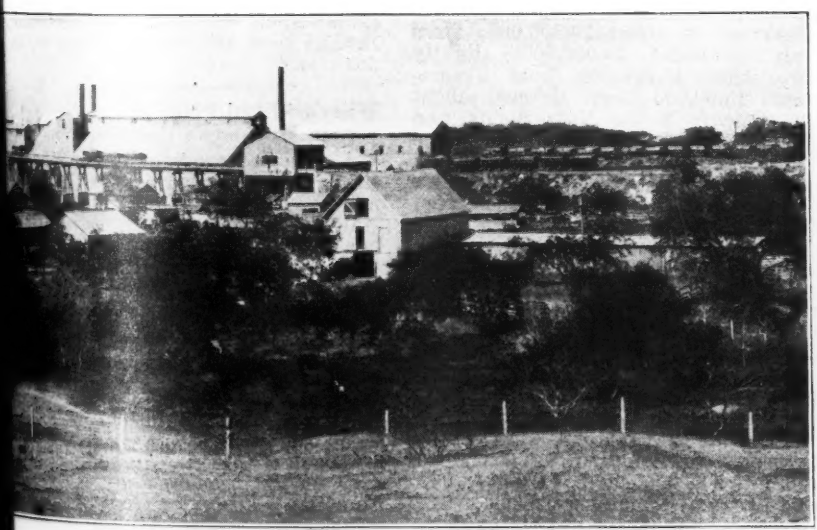


A General View of the Eagle

per hour. Combination Mills 7 by 26 feet have been installed for raw and finish grinding. One kiln 11¼ by 240 feet will be the original installation. Bates Valve Bag Packers will be used and a concrete silo type storage of approximately 80,000 barrel capacity has been erected. Machine shop, plant office, laboratory and supply room are all under one roof. One large concrete storage building, approximately 75x360 feet will be used for rock, shale, clinker and gypsum storage. A Shepard electric overhead grab bucket crane, which travels the entire length of the building, has been installed for handling the material into the individual bins. The construction of the plant is such that many troublesome elevators and conveyors are eliminated. The handling of all materials will be reduced to the minimum and it is expected that 75 men can operate the plant to a capacity of 1,650 barrels per day. The plant layout is such that units can be added at any time without great additional costs and the plant can be increased to total 5,000 barrels per day if necessary. Owing to a very favorable rate, power will be purchased for the time being. With sufficient raw materials to last many years, advantageous location, the advantage of proven cement mill engineering, coupled with the knowledge of competent cement mill operators, the Trinity Portland Cement Company plant at Fort Worth, Texas, on account of simplicity of construction, is about the last word in cement mill construction up to this time.

The output of the Trinity Portland Cement Company in this territory will be approximately 2,000,000 barrels yearly, with the plant flexibility allowing for increase to 3,000,000 barrels with the addition of a small amount of labor and machinery and on very short notice. A few years back the output was approximately 750,000 barrels yearly. The management has had explicit faith in this territory and feel the demand will reach the high production mark they have established.

President, Mr. W. H. L. McCourtie, General Manager, Mr. C. E. Ulrickson and General Superintendent, Mr. O. V. Bartholomew, have spent much time on all details of construction of the Fort Worth plant, also studied closely all improvements at the Dallas plant. On account of the proximity of the two plants, which are located about 30 miles apart, the management will be practically under one head eliminating much unnecessary expense, which will further assist in maintaining low ultimate manufacturing costs. The management of the company is in the hands of men who have spent many years in the industry and whose knowledge is such that success is assured and should make this two plants unit a factor in the ce-



ity Portland Cement Company.

ment market of the Southwest. The personnel of the Trinity Portland Cement Company is as follows:

President, W. H. L. McCourtie; Vice Pres. and General Manager, C. E. Ulrickson; Sales Manager, S. S. Parsons; General Superintendnet, O. V. Bartholomew; Supt. Ft. Worth Plant, A. A. Chaney; Chief Chemist, J. W. Ganzer; Traffic Manager, G. G. Tomlinson; Purchasing Agent, J. J. Horgan; Auditor, P. A. Bailey; Asst. Secy., J. F. Hayden.

IMPORTS INDICATE EUROPE'S RECOVERY

THE fact that the economic rehabilitation of Europe means increased competition for American manufacturers is shown in the analysis of U. S. foreign trade for January, issued today by the Department of Commerce.

U. S. imports from Europe in January, 1925, totaled $102,805,855 in value, against $87,988,693 in January, 1924 an increase of about $15,000,000. Our total increase in imports between the two periods was about $51,000,000. Our imports from Asia also showed a large increase being about $24,000,000 heavier in January this year than they were in January 1924.

Curiously enough, the fear of German competition appears to be unfounded. Imports from Germany were only slightly larger this year than they were last year. The gain in imports from Great Britain amounted to about $4,500,000; from Italy to about $3,000,000; slightly more than $3,000,000 from France, about 1,500,000 from Greece; about the same from the Netherlands, and over $2,000,000 from Sweden. Large declines were shown in imports from Denmark and Norway, with smaller declines in U. S. taking of goods from Belgium and Spain.

The gain in imports, however, was offset by a total gain in exports between the two periods amounting to a little more than $51,00,000. To Europe alone U. S. exports in January of this year were $67,000,000 heavier than last year, but our exports to Asia declined by about $22,000,000 bringing down the total. Our chief gains in exports were about $3,000,000 to Belgium, $1,000,000 to Denmark, $6,000,000 to France, $9,000,000 to Germany, $2,000,000 to Greece, over $5,000,000 to Italy, nearly $4,000,000 to the Netherlands and about $2,000,000 each to Russia and Spain.

Teaching Safety

An illustrated safe practice pamphlet dealing with "Teaching Safety to New Employees," has just been published by the National Safety Council. The pamphlet is non-technical in reading matter and is the combined experience of the industrial members of the Council. It is edited by 75 safety engineers who form a volunteer committee for such work.

"One of the most important considerations of industrial management is the introduction of the new employees into the plant," reads the introduction. Statistics show that the new employee is more liable to injury than one who has seen long service. "Accidents to new employees are due not so much to carelessness or thoughtlessness as to lack of familiarity with the hazards and working conditions. Another factor is nervousness due to a desire to equal the production or speed of the more experienced workmen. Mechanical safeguards in specific industries may, to a certain extent, prevent accidents from both of those causes. The greater number of accidents, however, occur from causes that are not preventable by guards. Education and supervision are the only effective methods of attack for such accidents. This makes it very important that special care be taken to teach the beginner. The experience of the National Safety Council shows that it is advisable to reach the new man just as soon after his employment as possible."

Wisconsin Bill Plans Change in Workmen's Compensation Law

A measure pending in the Wisconsin legislature provides for a workmen's compensation monopolistic state fund similar to the present Ohio law. Under the provisions of the pending legislation no workmen's compensation policy could be issued by any company transacting the business of workmen's compensation insurance in the state for a period beyond June 30, 1926. In addition, all such policies, whether continuing or otherwise, shall be deemed cancelled as of that date, if the bill in question is enacted into law. The measure provides for the creation of a compensation insurance board, which would serve without pay, to be made up of the attorney general, the secretary of state and the commissioner of insurance.

Waste Heat Boilers

Written Expressly for PIT AND QUARRY by CHARLES LONGENECKER

IN THE majority of instances the installation of waste heat boilers has proved to be either a great success or an utter failure, financially. There is no half way ground. The reason for failure has been due to error in justly appraising the several factors which make, or do not make, the installation of waste heat boilers advisable.

There are two methods of reclaiming the heat in waste, or spent gases from furnaces. There are the air preheater, or recuperator which as its name implies, heats the air used for combustion, and the waste heat boiler which generates steam. Which method to employ depends on the individual conditions. One or the other may be advisable, or possibly neither is warranted. The factors to be considered are:

1—What amount of heat is available?

2—Is the supply of heat intermittent?

3—Will the return in power warrant the investment?

4—Are the gases clean enough to insure steady boiler operation?

5—Is the temperature of the waste gases high enough?

6—If stack is already in place, is there sufficient draft or must a fan be installed for creating draft?

7—Is the power balance between direct and indirect fired steam generating units maintained?

The amount of heat available is that in the gases which pass out of the furnace. The direct fired boiler receives a large amount of heat by radiation. The waste heat boiler receives no radiant heat. All heat is transferred by connection. The total amount of heat in British Thermal Units is found by multiplying the weight of furnace gases by the specific heat, per pound, and this quantity by the temperature of the gases at the furnace outlet. From an analysis of the gases the weight per cubic foot and specific heat can be determined. The number of cubic feet can be formed from the area of the furnace outlet and the velocity of the gases passing through this outlet. A pyrometer will give the temperature of the gases. Care should be exercised that radiation from hot surfaces to the pyrometer does not give a higher reading than the correct one. Another method to find the quantity of gases is to determine the theoretical quantity of air needed to burn the fuel and by analyzing the products of combustion obtain the per cent of excess air and hence the volume of gas per unit of fuel. Also knowing by analysis the carbon in the fuel and the carbon in the spent gases the quantity of the latter in cubic feet is easily obtained. This latter method is not applicable where carbon can come from sources other than the fuel as in cement kiln practice. The quantity of gases will vary greatly in all types of furnaces, so that all calculations should be based on the minimum quantity. Any air drawn in between the furnace outlet and boiler will naturally lower the temperature of the products of combustion and likewise lower efficiency.

Intermittent heat supply has been the cause of many waste heat boilers failing to give the results expected. In instances where dependence has been placed on steady furnace, or kiln, operation and such operation could not be maintained, boilers are kept idle. This means no steam and also no return on the investment with a consequent loss dependent in size on the conditions existing at the particular plant and the duration of the idle period. To minimize this danger it is desirable, where possible, to arrange the furnace or kiln flues so that a boiler may be supplied with heat from furnaces or kilns other than the one to which it is directly connected. Means can also be provided to fire the boiler direct in case of failure of the indirect heat supply.

The third item—return on investment—must be given careful consideration. This is largely dependent on the other items. The highest returns will be received when a maximum quantity of steam is generated and economically utilized. Where a plant has both a power plant and waste heat boilers, a proper balance in boiler output must be maintained. Steam can be generated in waste heat boilers at a lower price than in direct fired boilers, if conditions are as they should be. Under such conditions the direct fired boiler can be

"taken off the line" if not needed, but where the waste heat boiler causes shutting down the direct fired boiler, the investment and overhead or the latter is "tied up." There is no hard and fast rule to be followed in determining the capacity of waste heat boiler to install. It is a problem for the individual plant.

The early history of the application of waste heat boilers to cement kilns presents a most interesting example of the effect of unclean gases. As is well known, the first installations were failures because of troubles originating from the dust coating in the tubes, etc. This feature has been remedied today as regards the cement kiln, but various types of melting furnaces still experience trouble in some degree and under certain conditions.

The temperatures of the gases leaving the furnace have a very material bearing on the efficiency which can be reached. Temperature and velocity are both vital factors. The temperature of the gases leaving a cement kiln will run from 1,150° F. to 1,400° F. and will be cooled in passing through the boiler to from 400° to 600°. If the temperature of the gases entering the boiler is too low, it is apparent that relatively poor efficiency will be reached.

There is a minimum draft for every furnace or kiln and hence in placing a waste heat boiler on a furnace this draft must be maintained. (The loss of draft in waste heat boilers will average from 2 to 3 inches of water.) The added resistance of the boiler must not interfere with the furnace operation. For this reason it has been found most satisfactory to install a fan by means of which the draft can be kept at that point found to produce the best results.

It is essential for the most economical operation to have a proper balance between direct fired boilers and waste heat boilers. This is especially so in small plants. If attention is not given to this feature, less attractive economy will be secured. In this connection care must be taken to select the boiler with correct capacity. This can be done only after a careful determination of the heat available. Probably the majority of waste heat boilers operate at capacities below normal. It is good engineering practice to get the most steam from the equipment. In central stations ratings up to 300 per cent are very common and 200 per cent is average. This shows the contrast between the two types of boilers.

The foregoing items present features which must be given consideration in any contemplated addition of boilers of this type. Where conditions are favorable, there is no question as to the advisability of increasing the steaming capacity by the means under discussion. There are always some features which are peculiar to individual plants and may exert a determining influence. Such features would include: price of fuel, cost of installations, price of purchased power, etc.

In cement kiln practice approximately 40 per cent of the heat supplied is carried out the stack, and of this amount an average of 60 per cent can be recovered. From these figures it is possible to approximate the saving in heat which can be made by installing waste heat boilers. Soot blowers will dislodge the dust collection from the tubes, and this dust can be collected and reclaimed. The more inefficiently coal is burned in the cement kiln the greater will be the saving by installing waste heat boilers. Any carbon not burned in the kiln can be burned in the boiler by admitting air at boiler inlet.

In other types of industrial furnaces the problem is frequently more contemplated than in cement mill practice as in this latter industry conditions are, comparatively speaking, much better standardized. In most industrial furnaces the heat supplied to the boiler varies, due to the nature of the process in the furnaces. In malleable iron melting furnaces the gases leave the furnace at temperatures as high as 2,600° F. at one stage of the process while at starting and for an hour or so after, the temperature of waste gases will be 1,000° to 1,500° F. In cement kiln on the other hand the temperature in the kiln, and hence of gases leaving it, is uniformly constant so that more satisfactory boiler heating conditions are realized. Where the "wet process" is employed naturally the temperature of the gases is lower and boiler efficiency not as high as in kiln operating on dry material.

Residents near the quarry of the Commercial Rock Crusher Co., Kansas City, Mo., are complaining of the blasts in the quarry and the rock dust settling in the neighborhood. G. S. Landrey has filed a suit against the company.

The Edward Balf Company Covers Many Angles

Operating Crushed Stone, Sand and Gravel and Macadam Plants Trucks an Important Factor in the Delivery and Contract Work

A HISTORY of the crushed stone and sand operations in Connecticut would be incomplete without a reference to The Edward Balf Company at Hartford, Connecticut. The Edward Balf Company has served Hartford and its neighboring towns for a period close to fifty years under the efficient management of its President, Mr. Edward Balf.

Previous to 1916 The Balf Company was engaged in an extensive trucking business, operating about 250 horses and hauling materials for the large manufacturing plants and stores in the city of Hartford. In addition The Balf Company handled the excavating work on many of the large business plants and buildings and many of the houses in the residential section.

In 1903 The Edward Balf Company commenced operations at Tariffville, Connecticut, building a stone crusher for steam railroad deliveries. In 1913 The Balf Company took over the Hartford Trap Rock and Supply Company's Plant at Newington and built a second plant within a short distance, just north, of this plant.

The Tariffville Quarry is located in the town of Tariffville on the Central New England Railway and is a hand loaded plant. Steam drills are used at this plant. The crusher house is an up-to-date building of its kind and

General View of Quarry Face Showing Height.

houses in it one Allis-Chalmers number 6 crusher, two Allis-Chalmers number 4 crushers and one Symons disc, one shaker screen, one scalping screen and one pulsating screen. A bucket belt conveyor system is used in this plant. As before stated this is wholly a steam road plant with a maximum capacity of 600 tons per day. A 150 H.P., 2 phase, 60 cycles 440 volt motor drives the crushing equipment and a 30 H.P. motor of the same current characteristics drives the screening equipment.

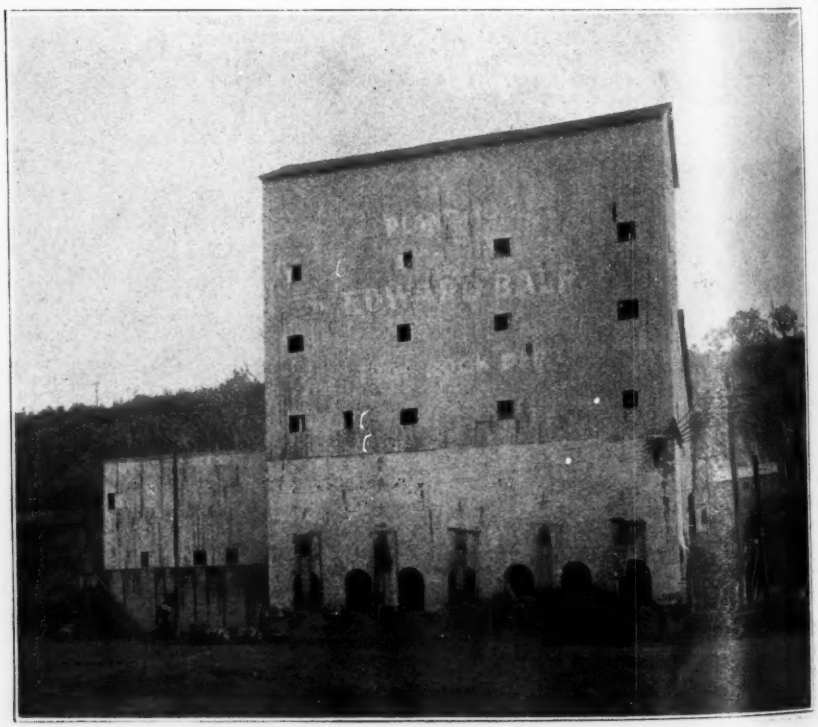
The quarry face at Tariffville is 115 feet in height. Quarry cars run by gravity to the foot of the plant incline and are hauled to the crusher mouth by cable.

The Newington operation is the more important of the two plants. Number three plant or the former Hartford Trap Rock and Supply Company Plant has been inactive for several years. This plant is electrically driven by two 75 H.P. motors at 600 volt D. C. and houses within it two Farrell jaw and two Champion jaw crushers together with two sizing screens. This plant was a hand loaded plant with a gravity feed to the crushers.

Plant number 2 is the largest of the three operations and will be covered in more detail. This plant is located four miles from Hartford City Hall and is served by the Connecticut Company, the local trolley line. Three and four compartment dump cars built especially for this work and carrying 18 and 25 tons respectively, operate from the plant to Hartford and in fact to any point on the Connecticut Company Lines. The distance of four miles from the city makes the truck haul an easy one and the greater tonnage of the plant is hauled by trucks.

The company also owns a right of way from this plant to the main line of the New York, New Haven & Hartford R. R. at Newington Junction and anticipates in the near future a physical connection with the steam road at this point.

The rock is an igneous rock in columnar formation. This is a helpful factor in the primary blasting. The



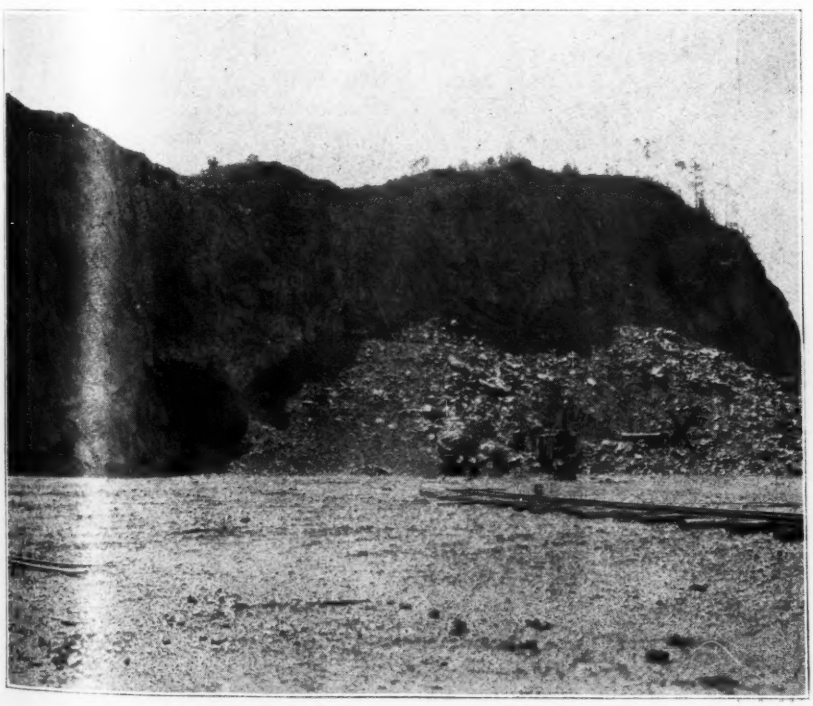
View of Newington Plant from Highway.

quarry face has a minimum height of about 100 feet increasing to about 200 feet at the peak. The working face is about 1,000 feet long. Well drill holes have been used quite successfully but have been abandoned within the last few years in favor of holes drilled with the Ingersoll Rand X70 Leyner Drifter, the so-called "Snake Holes." They make an average footage of 90 feet per 10 hours with this machine and have drilled 120 feet for the same period. Compressed air is supplied by a Sullivan single compound compressor and the drill steel is sharpened with an Ingersoll Rand drill sharpener. Block holes are used for secondary blasting drilled with jackhammers and they are forced at times to mudcap or "dobe" so as not to delay shovel operations. Four shovels are in use at the present time, one 1¼ yard Osgood Heavy Duty steam shovel, one type B Erie ¾ yard steam shovel and two Thew electric shovels with a ⅞ yard dipper.

The crusher plant is located about 300 feet from the quarry face but since the plant is located at one end of the quarry the haulage distance is about 1,000 feet when the opposite end of the quarry is being worked.

End dump cars with a capacity of about 3½ yards are employed. The grade of the quarry floor from the face to the plant enables the loaded cars to drift in by gravity to the tipple. The empties are then returned to their respective shovels with two Plymouth locomotives for a total of eight cars, two cars being pushed back at each trip. The track system is 36 inch gauge, a straightaway run to the tipple with sufficient side trackage for the empties to keep the main feed rail open when the cars are being returned.

The plant has a type B 36x54 inch Buchanan jaw crusher operated by a 200 HP Allis-Chalmers motor at 440 volts 2 phase as the primary breaker in which the stone is reduced to about six inches or smaller. The product from this machine is then elevated by means of a short Buchanan chain bucket elevator so that it may be dropped into another breaker which is on a slightly lower level than the jaw crusher but not sufficiently low to make possible a gravity feed.



Section View of Face Showing Shovel at Work.

The secondary crusher is a number 7½ Gates Gyratory breaker manufactured by the Allis-Chalmers Manufacturing Company. The product from this machine is elevated by means of a Number 8-B Allis-Chalmers belt bucket elevator to the top of the plant a distance of about 70 feet where it is equally divided between two Allis-Chalmers 48 inch by 16 feet scalping screens. The rejections, about 2-inch, are returned by gravity and recrushed in four Number 4-K Allis-Chalmers gyratories these products being returned to the scalping screens on the same elevator as that serving the Number 7½ machine.

The sizable stone is screened in two 40 inch by 18 feet Allis-Chalmers rotating screens. One screen is fed stone ranging from 2-inch to ⅞-inch inclusive and the second screen handles the sizes from ¾-inch to dust. The stone passing through the ½-inch holes in the sizing screen is rescreened on a Chalmers and Williams shaker screen to remove all traces of dust. A Symons disc crusher was formerly used for recrushing the surplus two inch stone but has been replaced by a Number 4-N Allis-Chalmers gyratory with an oversize head which is proving very satisfactory as a recrushing unit.

One set of bins is directly beneath the screens. These are of concrete construction as are all the foundations for the machines and are considered the operating bins. The storage bins located at one side are fed by means of flat belt conveyors with automatic discharge. The bin storage capacity at this plant is approximately 2,000 tons.

The plant is electrically driven throughout. A 300 HP 2 phase Allis-Chalmers induction motor drives the 7½ K. breaker, the elevator belt, two scalping screens and four Number 4-K breakers. A 50 HP Westinghouse motor drives the sizing screens and a 40 HP Westinghouse motor the conveyors. An up-to-date blacksmith shop equipped with pits is located on the quarry floor with track connections to the main quarry tracks and contains a complete installation of forges, drills and other tools neces-

Close-Up View of Newington Quarry.

sary for the proper up-keep of the quarry equipment.

At State Street in the heart of the City of Hartford, stone bins holding 600 tons of stone are owned by the Company and are fed by trolley from Newington. A water service connection with the Newington water mains provides ample water supply for the operation of the plant. Hydrants in the yard with stationary hose connections and hose conveniently placed in the building provide properly for the fire hazard. The Company operates seventeen trucks, 13 Macks, one Packard and 3 Pierce Arrows which are used wholly in the business of the Company.

On the river bank in East Hartford is located the sand plant of the Company, the sand being dredged from the bed of the river by means of a Sauerman drag line. The sand is dumped over a concrete tunnel equipped with traps into which trucks are driven. Lever operated gates control the flow of sand into the trucks and it requires but about one minute to load a five ton truck.

In addition the Balf Company builds asphalt, concrete and macadam roads being for many years the successful bidder for improving asphalt pavement in the City of Hartford and performing many asphalt and concrete operations for the State of Connecticut. A permanent asphalt plant of 2,000 yards per day capacity is located on the Valley Division of New York, New Haven & Hartford R. R. in Hartford close to the center of the City where the mixing is done. The plant has a storage capacity of 25,000 gallons of raw asphalt.

In its pavement work The Edward Balf Company uses its own stone and sand which provides for the City or State, speed in construction and a high class of materials in the operations. For its paving work Koehring mixers, Erie & Keystone shovels 3-5-8-10 and 14 ton steam rollers give ample equipment capacity for any sized operation placed for bid by either City or State. The ten ton roller is equipped with a scarifier for light resurfacing.

Mr. Edward Balf is president and treasurer of The Edward Balf Company. Mr. E. R. Molt is secretary and Mr. W. B. Welch and Mr. E. D. Crogan are superintendents.

Anthony Nebulyte Burners

Two new bulletins issued by The Anthony Company of Long Island City, New York, describe *The Anthony Nebulyte Oil Burner* and *The Anthony Nebulyte Oil Burning System* for boilers.

General View of Newington Plant from Top of Cliff.

REPORTS FROM	SALES Year 1924 compared with Year 1923				COLLECTIONS Year 1924			PRICES Year 1924 Compared with Year 1923			FORECAST Sales 1925		FORECAST Prices 1925		
	Reporting Increase	Average Increase	Reporting Decrease	Average Increase	Reporting Good	Reporting Fair	Reporting Slow	Reporting Higher	Reporting Same	Reporting Lower	Expecting Increase	Expecting Decrease	Expecting Higher	Expecting Steady	Expecting Lower
East	42	12	58	12	60	33	7	27	41	32	94	6	46	45	9
Southeast	48	12	52	13	48	43	9	33	32	35	90	10	49	45	6
Middle West	44	14	55	9	60	36	9	28	40	32	97	3	53	41	6
Southwest	77	16	23	6	73	27	..	38	44	18	92	8	41	56	3
Pacific Coast	47	21	53	11	58	42	..	34	40	26	96	4	43	47	10
All Sections	43	13	57	10	57	37	5	32	39	29	94	6	46	47	7
Wholesale Grocers	68	17	32	5	38	53	9	56	37	7	97	3	54	42	4
Wholesale Drugs	63	9	37	4	56	25	19	13	81	6	100	..	38	62	..
Wholesale Dry Goods	24	7	76	13	50	44	6	9	27	64	97	3	42	52	6
Packers	100	14	..	..	80	20	..	60	20	20	100	..	60	40	..
Department Stores	50	11	50	11	44	47	9	29	44	27	88	12	21	76	3
Chain Stores	100	14	..	..	..	..	..	37	37	13	100	..	38	12	..
Paper Manufacturers	55	11	45	11	57	41	2	11	51	37	100	..	38	62	..
Stoves	75	15	25	18	63	37	..	..	88	12	100	..	13	62	25
Hardware	38	10	62	10	53	41	6	22	47	31	99	1	49	49	2
Tools, Machinery, Wire, etc.	45	18	55	16	55	38	6	12	54	34	96	4	51	42	7
Lumber and Building Material	45	16	55	12	62	32	5	17	37	46	93	7	55	37	8
Agricultural Implements	56	17	44	16	78	22	..	11	56	33	100	..	45	45	10
Textiles	50	20	50	17	47	53	..	26	40	34	93	7	31	62	7
Hosiery	40	17	60	2	71	29	..	38	25	37	100	..	43	43	14
Oil	70	21	30	13	80	10	10	27	18	55	90	10	45	55	..
Flour Mills	81	15	19	11	76	25	..	88	9	3	97	3	55	39	6
Automobiles and Accessories	56	43	44	14	56	44	..	11	78	11	100	..	33	56	11
Shoe Manufacturers	38	9	62	16	27	69	4	35	35	30	92	8	85	15	..
Furniture	32	10	68	9	46	46	8	12	42	46	96	4	27	69	4
China, Pottery	36	9	64	18	55	28	17	12	44	44	100	..	..	83	17
Hats	25	5	75	8	50	37	13	25	50	25	67	33	50	38	12
Tanners and Leather Goods	18	18	52	14	88	12	..	32	36	32	92	8	68	28	4
Miscellaneous	53	11	47	11	51	42	7	24	51	25	95	5	25	73	2

1924-1925 Business Analysis and Forecast

A 1924-1925 business analysis and forecast, which is compiled annually by their commercial paper department, has been made public by George H. Burr & Co. The analysis is based on replies of approximately 3,000 companies in diversified lines in all parts of the country.

An interesting statement in the analysis is that a decrease of more than 50 per cent in the number of companies reporting increased sales for the last year is shown. Ninety per cent of all organizations reported increased sales for 1923 as compared with 1922, while for 1924 only 43 per cent reported sales gains for the year.

The analysis, comparing 1924 with 1923, indicates that collections of all lines reporting remained on practically the same levels with the most noticeable exception being in the southeast, where in 1923, 73 per cent reported "good collections" and in 1924, this percentage dropped to 48 per cent with "fair collections" of 43 per cent and 9 per cent "slow."

While a slightly greater percentage of concerns indicated expectations of increases in sales during 1925, those expecting higher prices have increased over 100 per cent as compared with 1924.

Of the various lines analyzed, chain stores are the only class of business which have reported increases in their sales for 1923 and 1924, with none reporting decrease in sales.

TAX CUTS SEEN IN '25 SURPLUS

DURING the current month the Treasury will be able to arrive at a very close estimate of how much surplus it will have at the end of the present fiscal year on June 30. When that point is reached the outlook for tax reduction and the extent of the reduction which can be made can be defined pretty accurately.

The March 15th income tax payments on incomes of 1924 are past due. With those payments made, the Treasury will know how much revenue it can look for under the new law. It already has an accurate estimate of what return may be expected from other revenue sources.

Some months ago the Treasury estimated for the current fiscal year a surplus slightly in excess of $67,000,000. However, expenditures have been held down very closely. The bonus payments, for instance, will not run as large as expected because many entitled to the bonus benefits have not applied for them. The drive for economy throughout the government also has saved a tidy sum.

Unless the new revenue bill brings in far less than estimated, the probable surplus figure for this fiscal year will have to be revised upward.

When Congress comes to consider tax reduction it will have in mind the probable surplus for the next fiscal year, the one ending June 30, 1926, rather than that for the current year, which will be history.

Nevertheless the current year's surplus will have a very direct bearing on the surplus for the next year and on the subject of tax reduction. The current year's surplus probably will be applied to the reduction of the national debt. Cutting the debt means reduction in interest charges. Reduction in interest at the end of this fiscal year means a large surplus at the end of the next fiscal year.

The estimated surplus for the fiscal year 1926 is, in round numbers, $374,000,000 It is altogether possible that reduced interest charges, further economy and increasing tax collections as result of business expansion may raise this surplus to around $500,000,000. That would be roughly the amount which would be lopped off the nation's tax bill by Congress.

One other thing can be stated with some certainty about taxation prospects, and that is that the next revision by Congress will see a lowering of surtax rates. Recent public speeches of some members of Congress indicate this, and it is shown even more strongly in their private conversation.

The surtax rate may not be taken to the 25 per cent maximum as advocated by Secretary Mellon, although such action by Congress can not be classed as improbable with the administration holding a stronger sway in the next Congress than in this one.

The reasons why Congress is swinging to surtax reductions are three:

(1) The influence of the administration is behind such a reduction and there has been a campaign of tax edu-

cation which has put the public more strongly behind it than ever before.

(2) Congress has already made such reductions for the smaller incomes that it can no longer disregard the justice of the demand that something be done for the incomes in the higher brackets.

(3) A relatively small percentage reduction in the lower brackets now will cut seriously into government revenues. A cut which would not look large would, in the aggregate, lop off a large sum of money. A much larger percentage of cuts can be made in surtaxes without cutting into revenues so deeply.

Move for Year-round Building Given Solid Backing

THE movement to increase the amount of winter construction is being pushed with vigor by local groups of business men and others connected with the building industry, according to a report to Secretary Hoover from Dr. John M. Gries, Chief of Commerce Department's Housing Division. Business men all over the country are aroused to the importance of stabilizing the building industry. Their activities are directed toward investigating local conditions in their communities and planning their future construction accordingly. Such activities are the keystone of the program for lengthening the construction season.

In Cleveland, Ohio, the Chamber of Commerce, the Builders' Exchange, and the Board of Lumber Dealers have appointed committees to study local building conditions and to devise effective methods for correcting the seasonal ups and downs. In Wilmington, Delaware, the Chamber of Commerce has condensed the arguments for a longer building season into a pamphlet which has been widely circulated. In Omaha, Nebr., the Builders' Exchange has given publicity to the subject through newspaper advertising. The St. Louis Master Builders' Association has done likewise.

The New York Building Congress, a pioneer in the winter construction movement, has made a thorough study of the prospects for winter work in New York and has issued a report which predicts considerable activity in the winter months. Recent experience, the report says, "very nearly establishes a new normal seasonal distribution of building volume."

The Philadelphia Building Congress, also one of the first to advocate winter work, has devoted much space to the subject in its publications and in the newspapers. In Chicago a long list of buildings is now under construction. The total valuation of contracts awarded for December in that city was well above the same month of 1923, due to the confidence aroused in winter building by local organizations. These instances are evidence of a widespread feeling that business in general has much to gain from more stable conditions in the building industry.

Several cities have already undertaken studies of local weather conditions, similar to the investigation made by the Department of Commerce in nine construction centers. Through these studies it is proposed to obtain from weather records the facts as to average and extreme weather conditions so that builders may have a basis on which to figure probable delays due to winter conditions. The Akron Builders' Exchange has arranged to cooperate with the Engineering College of the City of Akron for weather studies and the chapter of the Associated General Contractors in Los Angeles is undertaking similar work.

Frost Sand Mills

In a new publication, *Bulletin Number 300*, The Frost Manufacturing Company of Galesburg, Illinois, describes the construction and function of Frost Pans and Sand Mills—"Built on Honor, Made to Last."

"The reason why the success of the Frost Dry Pan Clay Crusher has been so pronounced since its introduction over 37 years ago," says the bulletin, "is because it has the greatest grinding capacity with the least power and lowest cost of repairs. The Frost Machine quickly demonstrated its superiority in the reduction of clay for dry pressed work and in the production of ordinary stock brick, fire-clay and sewer pipe."

Frost machines are said to be in use by concerns whose annual production runs to 100,000,000 brick, and they use these machines exclusively. Frost Dry and Wet Pans are made in 6, 7, 8, and 9 foot sizes. The text matter is supplemented by illustrations and blueprint diagrams.

Power for Digging

Written Expressly for PIT AND QUARRY by G. B. MASSEY

ON THE majority of excavating machines now in use steam is generated in boilers using coal and is used in reciprocating double cylinder engines. Some of the larger units burn oil under the boilers. In the smaller sizes vertical boilers predominate. The larger ones, where space permits, are equipped with horizontal locomotive type boilers which are more economical in fuel and more easily cared for.

The double cylinder, quarter crank engines are not designed for economy but to avoid dead centers and produce a powerful torque. The cut-off is comparatively late in the stroke. These engines seldom use less than fifty pounds of steam per brake horse power. Larger units, using triple expansion condensing engines will require about eighteen pounds of steam per brake horse power. This equipment is used on the larger hydraulic dredges.

Boilers on portable digging machines or on floating machines are not nearly so economical as stationary boilers because of the fact that the grate surface, the heating surface and the height of the stack are limited in extent so as to keep the weight and space occupied at the minimum. In order to utilize to better advantage the grate area and heating surface, the exhaust from the engines is used to create a forced draft in the stack. This results in a relatively high coal consumption because of imperfect or incomplete combustion.

It is seldom the case that small excavating machines can get along on less than seven or eight pounds of average coal per brake horse power per hour. The coal price figured in estimates should be based on the coal on board the machine. This should take into account all transportation and the consequent necessary loss in transit. For machines moving here and there about the country, the water supply is expensive and often most troublesome.

Comparison of Steam and Oil Engines

A pound of oil used in a heavy oil engine will develop two and a half times the power which a pound of oil will produce when burned under good boilers supplying steam to a high class steam engine. A pound of oil is the equivalent of one and four-tenths pounds of coal. This means that 75 gallons of oil costing four cents a gallon will develop in a heavy oil engine the same horse power as one short ton of coal at three dollars with the best boilers and best steam engines. But when considering the usual boilers and engines on excavating machines, the relation is that four cent oil is the equivalent to seven or eight dollar coal.

Heavy Oil

To be entirely independent of water supply, electric current and the high cost of fuel transportation and, in fact, the high first cost of fuel, machine makers are, in many cases, supplying oil engine drives. These machines operate at a ridiculously low fuel cost, using a very small quantity of oil which is easily transported with practically no loss. A small dragline with a ¾ cubic yard bucket can operate for ten hours at a fuel cost of $1.50.

Three types of engines are used, all vertical multi-cylinder. They are the semi-Diesel two-cycle, the Diesel type two-cycle and the Diesel type four-cycle. The first is the cheapest while the last is the best. Some of the two-cycle semi-Diesel engines and Diesel engines use the crank case for compressing the air to scavenge the cylinder, while others provide a space between the piston and the crank case in which the compression takes place. This is better because more positive and higher compression can be effected, thus reducing the effect of back pressure or relatively high terminal cylinder pressure due to the exhaust pipe.

The strict Diesel type with high pressure air compression for introducing the oil charge into the cylinder is seldom used on excavating machines. In its place the solid injection type is used which does not require any air compressor, but which does use the Diesel principle of firing the charge by the heat of compression only. Some of these solid injection engines are proving very suitable for this class of work.

The ten types of heavy oil engines now available are:

1. Semi Diesel two-cycle with trunk pistons.
2. Semi Diesel two-cycle with crossheads.

3. Diesel type two-cycle solid injection with trunk pistons.
4. Diesel type two-cycle solid injection with crossheads.
5. Diesel type four-cycle solid injection with trunk pistons.
6. Diesel type four-cycle solid injection with crossheads.
7. Diesel type two-cycle air injection with trunk pistons.
8. Diesel type two-cycle air injection with crossheads.
9. Diesel type four-cycle air injection with trunk pistons.
10. Diesel type four-cycle air injection with crossheads.

The list starts with the lowest first cost and highest operating cost and ends with the highest first cost and lowest operating expense. As the last four types listed are only built in relatively large sizes, it leaves the first six from which a selection may be made. For the operation of machinery direct by oil engines, a friction drive must be employed. These frictions must be able to pick up the load from rest while the engine maintains its normal speed. Frictions which are adequate on steam machines will not be effective on oil engine drives, as the steam engine is always slowed down to some extent when the frictions are applied.

Oil Engine—Electric

An installation with a high first cost but very satisfactory to operate is the heavy oil engine driving a generator which furnishes current for the various motors. This results in a low fuel cost and a very flexible driving system. It can be used where space, weight and first cost considerations are not limited.

Electric

Electric drive is ideal for excavating machinery as it is lighter and takes up less room than any other drive. It is available only for machines which operate in locations where current is obtainable and is not at all suitable for machines which are being moved about the country on contract work. Most of the electric machines in use transform the current on the machine from the higher line voltage to the operating voltage which is most often 440 volts. This allows the use of small flexible cables for bringing the current aboard. Some of the large machines use a higher voltage—2,300—in which case the transformers can be located permanently on the ground at a reasonable distance from the machines with very low loss.

The motors used are usually slip-ring polyphase induction motors with 30 per cent speed control. The small machines have manual control while the larger ones have master controllers with relay switches which automatically govern the current flowing through the motors for all speeds and torques. In machines using the Ward-Leonard system, a synchronous motor is used to drive one exciter and a direct current generator for each motor drive unit on the machine. The synchronous motor, exciter and the generators are all on the same shaft.

The advantages of this system are the synchronous motor, which improves the power factor of the line, and the lower current consumption due to the fact that no resistances are used but the speed and torque of the motors are controlled by varying the voltage in the direct-current circuits. On the largest electrical machines the power required per cubic yard handled runs between one-half K.W.H. and three-quarters of a K.W.H. while for the small machines it is not apt to be less than 1¼ K.W.H. Very small machines have one motor only with frictions for throwing the different machine units into gear.

Gasoline

Gasoline prices are several times the heavy oil prices and the weight, and therefore, the number of heat units are less so that the relation between the values is greater than the price relation. Gasoline engines, even the heavy duty ones, run at a higher speed with consequent greater depreciation. The fire hazard is much greater and the storage is more of a problem. Also the general use of gasoline induces pilfering. The gasoline engine is no easier to take care of than the heavy oil engine. There is a decided trend from gasoline to heavy oil on excavating machines. It is probably only a question of a short time before the gasoline engine will be eliminated entirely for all but the very lightest smallest machines.

BURTON JOINS FOOTE

Mr. Paul C. Burton, mechanical designer and inventor of several devices patented for the National Automatic Tool Co., Richmond, Indiana and the Mechanical Engineering Co., of Chicago, has recently joined the Engineering force of Foote Bros. Gear & Machine Company of Chicago.

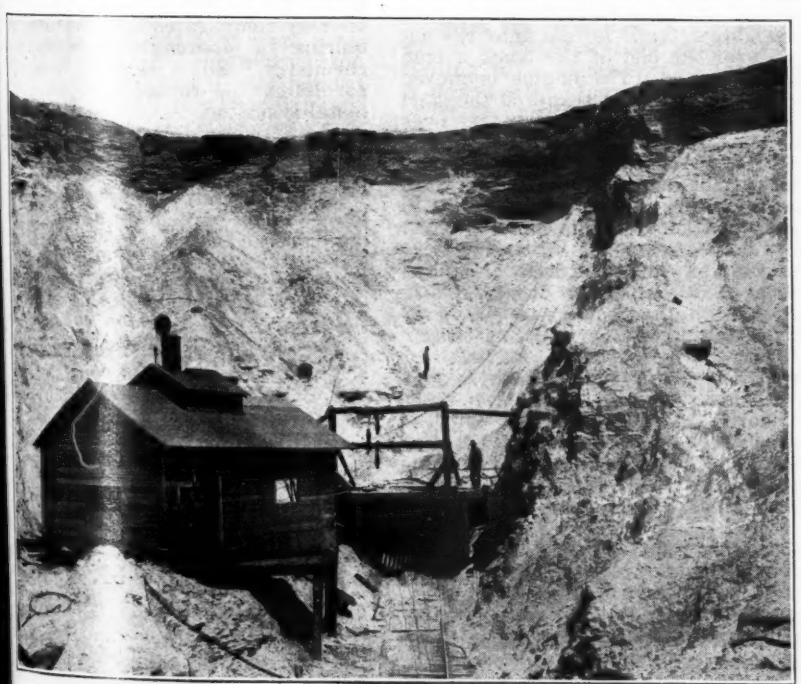
Reynolds Sand Company Producing Commercial Silica Sand

This Company Began Operations at Utica, Illinois, in 1887 Produces Four Grades Crude and Washed and Dried Silica

IN the nine-mile stretch between Ottawa and Utica, Illinois, along the main line of the Chicago, Rock Island & Pacific Railroad, lies one of the most important and valuable mineral deposits in the state. The mineral is silica and is produced from St. Peter sandstone, which belongs to the Cambrian period. This sandstone outcrops in Illinois, Wisconsin and northern Iowa where river valleys have worn away the overlying glacial drift. The sand grains of which this deposit is composed are almost pure silica or quartz. They are naturally white in color, but often are stained red, blue, orange, yellow and all the intermediate colors by percolating mineral waters.

The sand in the stretch between Ottawa and Utica is found both in the bluffs to the north of the railroad and in the level fields to the south of the right-of-way. While silica may be found almost anywhere, there are only fifteen fields of commercial value in the country, and of these the Ottawa-Utica district stands without an equal for quality and quantity. Silica is the most abundant element in the earth's crust except oxygen. It is used for many purposes and in many products; in sanding rails for street and steam railroads, in scouring powders, in paints as a filler, in cutting, grinding and engraving monuments and building stone, in testing cement, in the manufacture of dynamite, and in many other processes. Two important uses are in the making of glass and in making molds for casting steel.

In the Ottawa-Utica district nearly all of the molding sand is taken from



General View of Pit Showing Hoist House.

the bluff. The loam and clay, which vary in depth from a few inches to several feet, are first cleared away, and the stripping operation is performed with a scoop shovel dragged by a team of horses. The material is dumped into a convenient ravine. After a space from thirty to a hundred feet has been stripped, the rock is ready for blasting. Holes are drilled either in the face of the rock or down from the top and charged with one hundred to two thousand pounds of forty per cent dynamite, depending on the size of the area to be blasted. When the charge is exploded, the rock crumbles and becomes sand almost entirely free from lumps. The blast is sufficient to dislodge every grain and a crushing operation is not necessary.

Each sand pit has a side-track below the level of the pit upon which open-top freight cars are placed. The sand is loaded into the cars with a scoop shovel that holds a ton of sand and is manipulated with a steel cable. The power is supplied by a stationary engine mounted at the pit level on the opposite side of the track. When the face of the rock is worked back too far to make the drag line method of loading practicable, a narrow gauge track is laid into the pit and over the end of the track a trap is constructed. The engine is moved up alongside of the trap and the sand is dragged by the scoop shovel over the trap, where it falls into small cars which run down the narrow-gauge track and dump automatically into the freight cars.

The market for this molding sand may be as far east as Pittsburgh, as far west as San Francisco, or as far north as Winnipeg or Montreal. It is taken to the foundry, where it is mixed with clay or molasses water or some other bonding material to give it a plastic yet firm body so that it will not shift when the molten steel is poured into the mold. An impression of the article to be cast is made in the sand, the hot metal poured and the casting when cooled is ready for the sand blasting treatment.

Molten steel has a temperature of about 2800° Fahrenheit. Silica will stand a temperature of about 2900° Fahrenheit before fluxing or melting. Hence for steel molding purposes the sand must be almost pure silica. The clay or other bonding material used in making the mold melt when the metal is poured as does the slight natural bonds that come with the sand coating each grain, leaving minute air spaces between the grains of sand. These air spaces, called "vents," are essential to the success of the casting, since the gases from the metal escape through them.

The sand from the Ottawa-Utica district is of a uniform round grain, thus giving a uniform vent. Angular grains, such as are produced in districts where the silica rock has to be crushed, do not pack uniformly in the mold and consequently the venting is more free in one spot than in another, creating defects in the casting. If the mold were made of some other refractory material such as fire clay, which would pack solidly, there would be no vent and the gases from the metal would crack the mold; the casting would lose its shape and be a loss.

Few castings are solid metal, and the hollow parts are created by inserting in the mold wads of sand in the proper shape. These are called cores and are baked in an oven before insertion in the mold in order to make them hard enough to withstand the pressure of the pouring, as they are delicately balanced in the mold by pins. The process of molding is extremely complicated and technical, requiring a thorough knowledge of chemistry. Silica sand is used also for lining the furnaces in which the metal is melted. A very small grained sand is required for this purpose. This sand is found in a strata at the bottom of the pits.

The sand that is loaded from the pits without preparation, for molding, core and furnace purposes, is referred to as crude or "green" sand, indicating that it is not prepared in any way. The principal shippers of crude sand are:

Utica White Sand Company
Utica Fire Sand Company
E. J. Reynolds Sand Company
Ottawa Washed Sand & Gravel Company
Higby Canyon Sand Company
Illinois Valley Silica Company
Federal Silica Mines
Commonwealth Silica Company
Canal Silica Company
Belrose Brothers
Benson Brothers
American Silica Sand Company
H. G. Scherer
Crescent Silica Company

Some of these companies were among the first to enter the field of mining this sand. It is generally con-

ceded that Charles P. Brevoort of Chicago discovered the commercial value of the apparently worthless bluffs. He originally found the vein of silica at Millington, Illinois, twenty-two miles north of Ottawa, in 1888. It was later traced to the more accessible field between Ottawa and Utica.

There are four large producers of glass sand, known as washed and dried silica, in the Ottawa-Utica district. They are:

Ottawa Silica Company
E. J. Reynolds Sand Company
United States Silica Company
Wedron Silica Company

The Ottawa and the United States companies get their sand out of pits in the level field below the level of the railroad tracks. The Reynolds Company operates in the bluff, where they also have another pit producing crude sand. The Wedron Company gets its sand at Wedron, eight miles north of Ottawa on the C., B. & Q., but operates a grinding plant at Ottawa. All operate hydraulically.

The production of glass sand starts in the same way as the production of crude sand, by stripping the rock of its covering of loam and clay and disintegrating the grains of sand by blasting. They mine to a depth of about sixty feet, but if it were practical they could go down fifteen hundred feet and still find the best kind of silica sand. After the stripping and blasting the sand is piled loosely as it is blasted down against the face of the rock. Powerful streams of water are directed against the loose sand and it is washed down to the center of the pit, where it runs into a trap. A pump pulls the sand-laden water out of the trap and forces the mixture through a five or six inch pipe up grade to the washing and drying plant at the edge of the pit.

The purpose of the next process is to wash away the slight bond of iron oxide or clay which is distributed around every grain of sand and leave the pure grains of white silica. The process varies in individual companies, but the result is the same. In the Ottawa Silica Company the process is as follows: As the sand comes up from the pit it is dumped into one of two large bins, where it settles and the water is drained off. When No. 1 bin is filled, the stream is swung over to the second bin and a stream of water is directed into No. 1 bin, washing the sand through a trap at the side into another bin, where another pump forces it up into one of three large draining bins. Filling one of these draining bins represents a day's operation, and by the time the third bin has been filled the water has drained off sufficiently from the sand in the first bin so that the sand may be picked up with a grab bucket mounted on a traveling crane and dumped into the drying bins on the other side of the plant. By this time the action of the water in getting the sand out of the pit and the movement from one bin to the next has been sufficient to wash away all traces of the foreign matter which originally coated every grain of sand.

The drying bins into which the wet sand is dropped are honeycombed with pipes through which live steam passes continuously, day and night. As the sand gradually dries, it trickles through between the steam pipes and runs out at the bottom of the bins perfectly dry. From here it goes to a conveyor belt which carries it to the screening plant, where it passes by gravity over a series of vibrating screens. From the screens it is carried to storage bins, where it is loaded directly into box cars through spouts by gravity. The bulk of the sand thus graded is shipped to glass factories to be melted and used for windows, tableware and bottles. In melting silica to make glass the sand is mixed with other chemicals which bring the melting temperature down considerably.

The largest grained sand is sold for sand blast. The greater part of this is used in foundries in compressed air blowers to clean the rough surfaces of castings as they come from the mold. Crude sand is also used for sand blast. Sand blast is used in the making of monuments and for cutting and sawing stone. The Ottawa Silica Company and the Wedron Silica Company operate grinding plants where the washed and dried sand is reduced to a powder. The sand is ground in iron drums about ten feet in diameter and twenty-five feet long. These drums are two-thirds filled with large flint pebbles imported from Denmark and France. As the drums revolve, the shifting of the pebbles grinds the sand.

Foundrymen use ground silica to sprinkle over the face of completed sand molds in order to increase the heat resisting quality of the mold at the point of contact with the metal. Ground silica is the foundation of many paints. There are many more

uses for ground silica, but many of them are trade secrets.

The Valley Chemical & Manufacturing Company operates a large plant at Utica producing silicate of soda, commonly called "water glass." This is a liquid produced in a manner somewhat similar to the manufacture of glass; that is, by mixing washed and dried silica sand with various chemicals and melting in furnaces. The finished product is shipped in tank cars, drums and barrels, principally to manufacturers of paper box board, who use it as an adhesive. Silicate of soda is the most powerful adhesive known. It does not take hold as quickly as glue, which is manufactured from animal products, but when it does grip and dries it will never let go.

Silica sand as produced by the E. J. Reynolds Sand Company is a semi-hard sandstone. The deposit operated by this company consists of bluffs from sixty to one hundred and twenty feet in height. The sand is first stripped of its overburden, of from six inches to three feet of loam and clay, by teams, steam shovels or dragline, leaving an absolutely clean surface of sand.

Blast holes are drilled by an Austin well drill thirty feet back from the face in series of four and six. These holes are forty or sixty feet deep and are loaded with Atlas ammite. They are all loaded and exploded at the same time, with the result that from one hundred and fifty to two hundred and fifty cars of fairly fine loose sand are made ready for loading as crude silica sand. The amount of loose sand depends upon the amount of powder exploded.

This crude material is then loaded through a trap having two-inch steel grates for openings. The material is loaded by one 9x10 Lidgerwood and one 9x10 Clyde dragline engine with one-yard scrapers. The sand is loaded into five eleven-ton Koppel side dump cars which are hauled by a twenty-one-ton Davenport locomotive to a loading tipple. Here the sand is dumped into railway cars for shipment. The locomotive hauls enough sand each trip to load one standard railway car.

The crude sand pits consist of approximately fifty feet of steel casting sand, ten to fourteen feet of furnace bottom or core sand, and four to six feet of welding sand. In grading, all these veins are shot and loaded separately.

In the production of the washed and dried silica the material is blasted in the same manner as above. The sand is washed from the shattered ledge, however, by a stream of water. The water is furnished from a pump by a 12 by 7 by 12 Gardner steam pump. This pump develops one hundred and twenty pounds pressure at the nozzle of the hose. One man holds the hose and directs the stream against the face of the blasted ledge. The loose sand is then carried to the bottom of the pit. Here a large five-foot double valve Knowles sand pump picks up the sand and discharges it through a string of six-inch pipe lines to a set of washing tanks. Here the water and dirt seep off.

The sand is again washed by twin streams of water and carried to another Knowles sand pump which lifts it into the drain bins of one hundred and seventy-five tons capacity. The sand is allowed to drain in these bins over a period of about twelve hours, after which it contains from seven to twelve per cent moisture. The material is then conveyed by means of screw conveyors placed at the bottom of the drain bins to a twenty-two-inch belt conveyor which discharges into an elevator which in turn lifts the material to the dryer. This dryer is a Cummer fuel oil dryer seventy-two inches in diameter and thirty-six feet long and is rotated about seven times in a minute. The sand is injected into the upper end of this dryer and is discharged at the lower end. It is perfectly dry when discharged. It falls into an elevator and is lifted to gravity screens over storage bins. The sand is loaded from storage bins by gravity through steel loading spouts into paper-lined box cars.

The E. J. Reynolds Sand Company increased crude silica production in 1924 approximately ten cars a day by the addition of a new 9x10 Clyde dragline engine. There are now three dragline engines in operation. The installation of a new rotary drier shell increased the dried silica sand production approximately fifteen per cent. Production averaged forty cars a day during 1924, but this will be increased to sixty cars a day during 1925 through the installation of new equipment which has recently been completed.

The officers of the E. J. Reynolds Sand Company are: J. C. Love, president; H. C. Cary, vice president; Charles J. Niesen, secretary-treasurer, and A. S. Hindman, general manager.

Public Liability Insurance

Written Expressly for PIT AND QUARRY by DWIGHT INGRAM.*

ANYONE who injures the person or property of another shall either make restitution or pay for the damage. We first ran afoul of this principle of ethics in childhood when we broke the toy of a small neighbor and our parents bought a new one to replace it and deprived us of liberties and privileges to atone for the act. A few years later we had to work after school to earn money so as to replace the window in the grocery store that was smashed by a long fly from the baseball diamond. And as we grow older we never can get away from this responsibility for any effect our actions may have on the lives or property of those around us. It is a principle of the old common law. Occasionally it takes a queer turn, as in the case of one of the largest material producers whose insurance man is now worried over the fact that the blasting operations are preventing the hatching of eggs in the neighborhood and that there seems to be an unquestionable liability for this loss to the farmers.

The common law is modified in a few cases. For instance, a workman's compensation act may determine the extent of an employers' liability for a specific injury regardless of contributing circumstances. Or a railroad company in granting a lease or a switch track may make a corporation waive its inherent right to sue the road for damages, even fire, caused by it. But except for a few well known modifications, the old law stands and affects both commercial and private life.

The destruction of one's own life or property is much easier to understand than this liability for others. We appreciate the direct personal loss, and all of us carry fire, windstorm or other appropriate kind of insurance against it. But this other kind of risk—the legal liability—is more indefinite and more misunderstood. A big law suit can wipe out a business or at least seriously embarrass it. The risk of such suits is very real, and is certainly worth studying and insuring.

It would be ideal if a producer could simply telephone his insurance man to put on a blanket policy covering all of his legal liability. That would be a policy worth having, for it would get rid of the entire risk without having to puzzle over rates and policy forms. But such a simple policy has never been written, partly because no insurance company would accept an unlimited risk, and partly because we have no statistics accurate enough to know how to make up the proper rate for it.

In the field of practical insurance we find that actuaries are able to analyze the average cost of certain liability risks connected with business, and that by piecing together the different policies that cover his individual case a producer can approximate blanket insurance at a cost which he knows to be correct for the risks which the company assumes.

In the first place, insurance companies make a distinction between damage done to persons and damage done to property. When we speak of "liability insurance" or "public liability insurance" in a popular sense, we often mean only the liability for injuring or killing persons. The liability for destruction of others' property is then referred to as "property damage insurance." Some insurance policies cover both, some only one, and some cover the personal injuries but can add the property damage by endorsement to the same policy. When you buy a policy make sure that you know whether it covers both persons and property; do not assume that everything is included just because it is labeled "liability."

Many of the liability risks are so specific that they can be separately analyzed. Usually these do not apply to all plants, and it is therefore fairer to exclude them from general policies and issue insurance at an exact cost to just those property owners who need it. The greatest of these separate risks are automobile liability and property damage. Similar to these is liability for damage done by teams, wagons and bicycles. Explosions of steam boilers and damage done by elevators or hoists are the other important separate fields. The general public liability policy covers every source of accidents except these. So in protecting himself the producer will take the general policy, and then

*Engineer—Moore, Case, Lyman and Hubbard.

will buy such of the others as apply to his individual plant, knowing that the general policy does not cover any of these risks.

A problem that complicates the buying of liability insurance is that there is no unlimited policy or absolute protection. With fire insurance, if you hold policies equal to the sound value of your plant and have a reserve fund equal to the depreciation, you truly have full protection. Also, with workmen's compensation, your policy gives you complete insurance, because the limit of liability, in most states, is specifically defined by law. But with public liability you are dealing with the vagaries and uncertainties of the common law. Take a policy for $100,000, and it still would not be full insurance if a jury should award an injured person a verdict for $105,000. What limit to put in your policy must be studied carefully. The basic policy usually provides for all expenses of investigating and defending damage claims, and payment of awards up to $5,000 for injuries sustained by one person or $10,000 for the total of personal injuries in a single accident (referred to as "5/10 limits") and $1,000 for damage to property of others. These limits will take care of all small or ordinary losses, which are the ones that make up the bulk of daily loss experience. But it is the large claim that is vital, especially for personal injuries. Insurance for the small cases is a convenient way to get rid of the nuisance of hiring lawyers and appearing in court and of getting a fixed cost for the normal number of accidents. But it is the large claim, however unlikely it may be, that should be insured, for it is the large claim that can bring bankruptcy or embarrassment to your business. The large claims are provided for by increasing the basic policy limits for a small additional premium. While you do not want to carry too high limits, because you want to keep down the cost, the amount of your policy should be based on a rough study of court records in your state and your own estimate of what is the largest amount of damages that might be awarded against you, always remembering that a business man, and especially a corporation, is at a disadvantage before a jury.

There are two different ways of fixing the rate or premium to be charged for liability insurance. The general policy is usually carried in the same company that has the compensation insurance. The rate for this, in most of the non-metallic industries, is fifteen cents per one hundred dollars of pay roll. The adjustment of premium is just the same as for compensation, and the two are most often handled together. The policy holder pays a deposit at the beginning of the contract year according to his own estimate of what the annual pay roll will be; then at the end of the year the company sends an auditor to check over the pay roll account and an additional payment or a refund is agreed on according to the actual figures. This general insurance covers accidents sustained on the premises (other than to employees, which are covered by compensation) or due to the general nature or operation of the business. Common among the sorts of accidents which this policy guards against are injuries to inspectors and salesmen who visit the plant and get caught in machinery, slip on an icy step, etc., passing automobiles that skid into a quarry, and damage done to surrounding property by blasting.

Whether or not a particular producer needs elevator insurance depends on local conditions. It is probable that elevator property damage is of very little importance in the sand and gravel field, for it is seldom that anyone would ever have merchandise or property of his own near a plant elevator where it could be damaged. But insurance covering the liability for personal injuries is well worth its cost if there is any chance at all that inspectors or visitors will ever be on or near your elevators or hoists. The chances of accidents are many. Strangers get caught by cables, crush their hands against the shaft, or may be injured in getting on or off, besides all the hazard of mechanical trouble which may cause an accident. There are proportionately a great many more accidents around elevators than around other machinery or any other operating section of the plant. Elevators seem to be a focal point for trouble for the liability insurance companies. Rates for the basic limits of insurance on the kinds of elevators most commonly found in the gravel and stone business are as follows:

Kind of Elevator	Annual Rate for Personal Injuries	Property Damage
Hoist	$12.50	$ 5.00
Factory	13.50	10.00
One-story	12.50	5.00

Credits on the above rates are given if elevators are equipped with such safety devices as hoistway door interlocks and electric car gate contacts.

Teams liability insurance is a form that logically should have been developed many years ago. But its growth actually was slow until the automobile woke up the public to the seriousness of road accidents. Compared to the automobile a team of horses and wagon seems rather harmless. It is hard to figure out just why accidents do occur. It must be partly because drivers are careless and back into other vehicles or cut corners short, and to some extent it must be that horses are less easily controlled than automobiles. For with all the slow speed of the horse, it is remarkable that teams are responsible for their full share of accidents, and the damage they do to property of others is just barely covered by the rates charged for insurance. A striking difference between the team hazard and that of elevators, blasting and most other causes is that horses do more damage to property than to persons. This difference is reflected in the rates. The annual charge for liability for personal injuries is $13.75, while the rate for property damage is $20.00. These rates are "per driver" rather than per pair of horses, for there are often extra horses in a stable and the insurance company wishes to charge only for the average number in use all the time. The hazards covered by the policy are not only the chance of running over or into something on the road, but also the damage done in loading and unloading.

Steam boiler insurance is the one form of insurance that has already arrived at what we consider a high professional plane. Most of the premium paid goes for inspection service and engineering work that makes explosions improbable. There is a general trend through the insurance business to spend more and more money on accident prevention service and trust to a consequent decrease in losses to make up the cost of extra inspectors and engineers. This tendency has reached its highest development in the boiler field. When application is made for insurance on a boiler, the company sends an inspector promptly to go over the device carefully and make a complete report on what is necessary to make it safe, and frequently no policy is issued until these recommendations have been complied with. Then two or three times during the year an inspector visits the boiler again to look for signs of wear and deterioration, and his requests for improvements or repairs come with the positive force of orders; for if he finds a dangerous condition, he makes his opinion impressive by suspending the insurance until the boiler is made safe. This condition makes boiler insurance a valuable asset to a plant. Insured boilers are seldom allowed to get into such condition that they can make trouble. But uninsured boilers, even under the care of a competent local man, do explode. And when they do they cause havoc; the plant is damaged; business is stopped; and probably valuable human lives are lost.

The annual charge for liability insurance with limits of "$5,000/$15,000," which is the basic policy, is $26.16 for a high pressure or power boiler and $19.36 for a boiler of less than fifteen pounds pressure used for building heat only. These rates are increased slightly if there is more than one boiler in a plant or if the limit of liability is greater than $15,000 for injuries caused by a single accident.

It is courting commercial suicide for a producer to send an automobile truck a hundred yards without carrying liability insurance. Damage awards have been growing in recent years so that verdicts of $15,000 or more are not uncommon. There is no easier way to run a good business into bankruptcy than to drive trucks without insurance or with too low a limit in the policy. There can be no question about the vital need of the protection, and the principal caution that can be given is to warn the producer not just to "order a policy," but to pick out the right sized policy so that he is not likely to be stuck if the jury sets a new county record in the amount of its next verdict against him and his driver.

For rating purposes the counties of the country are divided into fifty territorial groups, according to the frequency of accidents in each. As between trucks of different weight, it has been found that all kinds have about the same number of accidents, but the heavier ones do more serious damage than the lighter. The extent of the risk depends largely, of course, on the amount of traffic on the roads, as can be seen from the following

comparison of rates for two of the fifty territories:

Rates for Chicago—

Type of Truck	Personal Injuries	Property Damage
Heavy	$87	$51
Medium	70	44
Light	46	25

Rates for Rural Districts—

Type of Truck	Personal Injuries	Property Damage
Heavy	$25	$20
Medium	20	17
Light	13	10

Rates for pleasure or passenger cars, of course, are considerably less than the above. These rates as quoted are only for the minimum limits, which have proven to be inadequate for full protection in most parts of the country. An increase of from twenty to thirty per cent, however, will give you a policy with limits of liability high enough to be considered safe.

There are some ways in which the cost of this insurance can be reduced. If a truck is to be laid up for sixty consecutive days or more during the season from November 1 to May 1 a pro rata refund can be secured on the premium. If a single producer owns a large number of trucks, say ten, a special rate can be estimated for his own "fleet" allowing credit for the loss record of his cars if that is favorable. If a producer owns more cars than he has drivers in active service, only 25 per cent of the full rate is charged for the excess automobiles.

Very often it happens that more than one party may be subject to the same risk. Owner and lessee, two or more members of a partnership, property owner and contractor doing work for him, these are common relationships under which the act of one party often involves a liability on the part of the other. Where the relationship is mixed and the extent of liability is therefore somewhat uncertain, the only safe course is for both parties to have insurance or for both names to appear on a single policy. The cost for insuring the additional interest is seldom more than one-fourth as much as the original policy. When one of these relationships is found, as when a teaming contractor is furnishing trucks for a producer, any injured person will bring suit against both producer and contractor, figuring that this is safe and that the jury will be inclined to put the blame on whichever of the two has more money.

Every accident that creates a legal liability can be prevented. We have already mentioned the technical engineering service of the steam boiler experts. In general around a plant there is usually need for better and stronger fences along the highways, especially near the lip of the quarry. In many cases warning signs and watchmen are not posted properly to keep the public away from danger. But the big liability risk is the human element. If employees are educated in safety measures, if they understand just what outsiders cannot do safely, if they handle their trucks and machinery carefully, most of the accident hazard can be eliminated. This is highly desirable, because accidents mean interruption of business as well as financial loss. And then the selection of the right insurance policies can remove all risk of jeopardizing future operation and profits through unscrupulous attorneys and expensive law suits.

CAR LOADINGS GAIN 22,418 IN ONE WEEK

Loading of revenue freight for the week ended on February 21 totaled 925,295 cars, according to tabulations made recently by the car service division of the American Railway Association of representatives filed with that organization by the carriers.

This was an increase of 22,418 cars over the preceding week when freight traffic was reduced somewhat, due to the observance of Lincoln's birthday. It also was an increase of 79,596 cars over the corresponding week in 1924 and 95,108 cars over the corresponding week in 1923.

In the corresponding weeks in the two previous years, however, loadings were reduced owing to the observance of Washington's birthday which this year was not celebrated until Monday, February 23, owing to the fact that the holiday fell on Sunday.

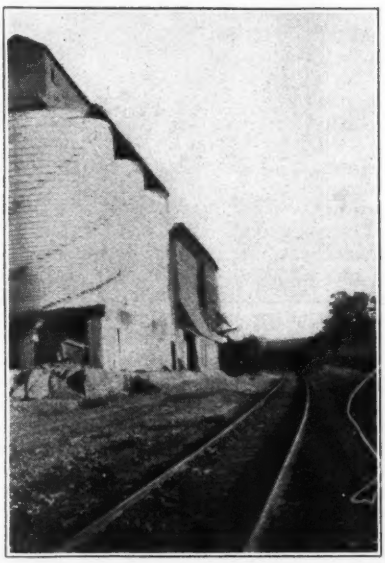
	1925	1924	1923
Feb. 21	925,295	845,679	830,187
Feb. 14	902,877	935,589	816,646
Jan. 31	896,055	929,623	865,314
Jan. 24	925,254	894,481	869,464
Jan. 17	932,150	894,851	864,297
Jan. 10	932,807	872,023	873,908
Feb. 7	928,244	906,017	849,352
Jan. 3	765,727	706,292	727,246

Conley Stone Company Operates Two Plants in New York

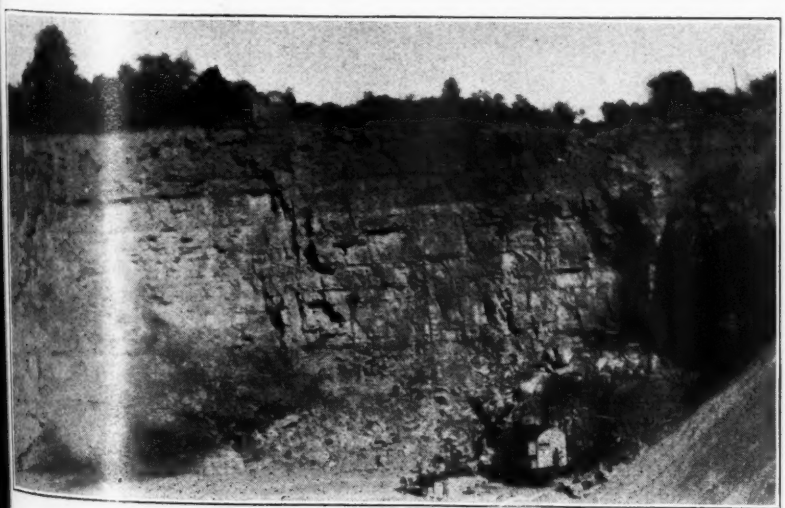
Enjoy Low Power Cost, Low Freight Rates and Good Market Drainage Tunnel Built to Handle Water from Heavy Rains

THE F. E. Conley Stone Company of Utica New York have developed an active market for agricultural lime. The company operates two plants. One of the plants is at Munns, New York, and the other is at Blakeslee, New York. The Munns plant is on the New York, Ontario and Western Railroad while the Blakeslee plant is on the Lehigh Valley Railroad. Some very attractive literature was used in a direct by mail advertising campaign last year. This material consists of artistic folders. There is a series of these. Each one is different and thus a fairly constant campaign was carried on. This literature is profusely illustrated with plant views. There is also text discussing the advantages of liming the soil, features of Conley's product, etc.

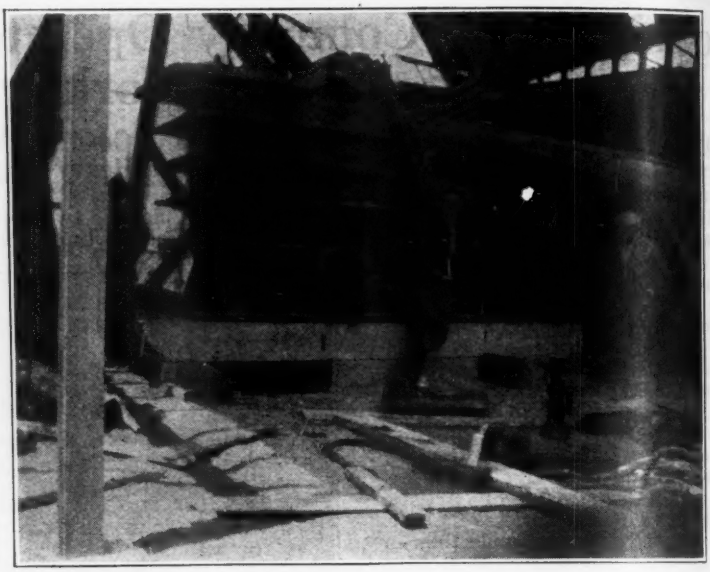
The agricultural lime plant at Munns New York was started in 1909 with a capacity of fifty cars a year. the plant now has a capacity of twenty two hundred cars a year. Pulverizers for grinding agricultural lime were installed in the Blakeslee plant in 1910. The present shipping capacity of this plant is two thousand cars a year. This growth of the agri-



Blakeslee Quarry, Agricultural Lime Storage.



Face of Ledge At Munn's Quarry.



Crusher at Munns Quarry.

cultural lime phase of the business has been due in no small measure to the advertising sales efforts.

The Munns quarry produces a high grade limestone rock acceptable for road building as well as the agricultural lime. The agricultural lime is shipped into several states. The stone is brought in from the quarry and dumped into a 30 by 36 Acme crusher. From this crusher the stone passes to a scalping screen. The rejects from this screen pass to a 25 by 30 Acme crusher. The discharge from this second crusher is elevated to two 4 by 30 revolving screens that have an output of 1,000 tons per day.

The quarry at this plant has a face

General View of Munns Plant.

of about one hundred feet, and covers an area of thirty acres. There is very little stripping to be done. Steam shovels load the material into steel quarry cars. Both electric and steam power is used. An electric well drill is used for drilling. During heavy rains operations were slowed up considerably so a drainage tunnel was built to take off the water. This tunnel is 7 by 350 feet and runs through solid rock 62 feet below the level of the surface. The tunnel enters the quarry 17 feet under the quarry floor. It is hoped that this arrangement will take care of all water during the heavy rains that are common in this territory during the spring.

A high grade limestone rock is produced at the Blakeslee plant, suitable for all purposes. The production of this plant during 1924 averaged 500 tons a day. Large quantities of agricultural lime are also produced. The quarry face is about seventy feet and the deposit covers twenty acres. There is very little stripping to be done at this quarry. The stone is loaded by hand into cars and hauled to the crusher. Well drills and also air drills are used in the quarry. Two Jeffrey pulverizers and two Acme jaw crushers are used.

The F. E. Conley Stone Company have enjoyed the advantage of a good location, low freight rates and a progressive market. They have done much to build up their market through effective sales and advertising campaigns. The improvements made during the winter and fall of 1924 have placed the company in a position to handle a greater demand in 1925 which should be forthcoming.

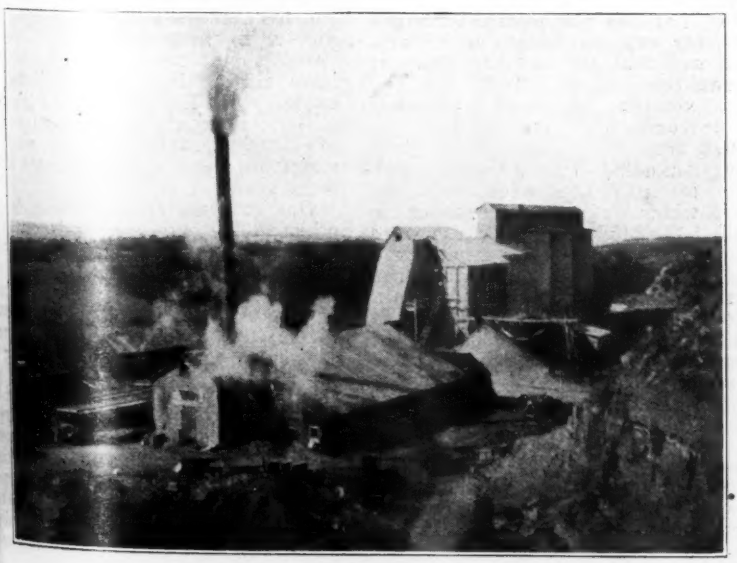
Mr. Hugh Conley is president. Mr. F. E. Conley is vice-president and general manager and Mr. G. A. Hunter is secretary and treasurer.

Universal Vibrating Screens

The latest types of Universal Mechanical Vibrating Screens are described in *Bulletin Number 50*, a booklet just issued by Universal Vibrating Screen Company of Racine, Wisconsin.

"The combined efforts of several of the leading engineers in the crushed stone and gravel producing industry," says the foreword, "with twenty-five years of practical experience behind them, resulted in the perfection of this mechanically vibrated screen. Universals are built to withstand the wear and tear of pit and quarry operation. They handle all materials with the highest efficiency ever attained in screening equipment."

Simplicity of construction is said to be an important factor in Universal construction. There are no frictional surfaces such as ratchets, eccentrics, cams or knockers to give trouble. Maintenance costs are low.



General View of Blakeslee Plant.

FREIGHT TRAFFIC IN 1924 SHOWS SLUMP

ALTHOUGH the railroads of the United States established a number of new operating records in 1924, the total freight traffic for the year, measured in net ton miles, declined 6.2 per cent, as compared with the year 1923. Figures just compiled by the Bureau of Railway Economics show that the total freight handled in the twelve months was represented by a net ton mileage of 429,453,224,000.

In the eastern district traffic for the year was 9.8 per cent under that for 1923; in the western district the difference in favor of 1923 was 4 per cent, in the western district the movement declined least of all, 1.5 per cent.

For the country, as a whole, freight traffic handled in 1924 was a decrease of 4 per cent from the level of 1920, was 2.4 per cent below that of 1918 and was 0.2 per cent less than in 1917.

Freight traffic during the first and the last three months of 1924 was the heaviest ever reported for any corresponding period, but a decline in business during the middle of the year resulted in a decrease for the entire year. In 1924 the carriers established the following records:

They were operated with the greatest efficiency and economy ever attained.

They handled the greatest freight traffic for any one month in history, which was that for October, when it amounted to 43,109,743,000 net ton miles, exceeding by about 1 per cent the previous high record made in August, 1920.

They handled the greatest peak traffic for any one week ever reported, which was that for October 25, when 1,112,345 freight cars were loaded.

They handled during the year the greatest amount of grain, and grain products ever offered to them, the total loading being 2,575,000 cars, an increase of 4.8 per cent over the previous high record made in 1922.

They also handled the greatest loading of miscellaneous freight during the year ever reported for any corresponding period.

The railroads successfully handled without car shortage or delay the freight traffic offered to them during the year.

During the late summer and early fall months, when traffic is always the heaviest, they had not less than 100,000 surplus cars in good repair and immediately available for service at all times while they also had during that time 5,000 servicable locomotives in storage which they did not find it necessary to use.

The Coal Situation

By JOHN H. JONES

NOTWITHSTANDING the fact that the fundamental conditions of our country and business, in general, are good, the problem facing the coal industry is a great one. The movement by railroads for the first six weeks of 1925 has been greater than the corresponding period for any previous year in history. The buying power of the farmer and the laborer is better now than it has been for some time. The confidence in our administration is great. Nevertheless, the coal industry is in a very chaotic condition.

The production of coal at this time is normal, and from present indications the tonnage mined in 1925 will be the greatest in history; but due to overdevelopment of mines, the supply is greater than the demand. In some sections of the country mines are operating fully; in others, plants have been idle for more than a year. The miners are restless. The price at which coal is being sold is less than the average cost of production. The answer to these conditions, in the future, is uncertain. Many operators have closed their mines. Some operators, who have contracts with their miners, have closed their mines and are leasing same to others who are operating them at less than the union wage scale.

One extreme always brings on another. The wise buyer is one who will make contracts with responsible producers at a price which will net them a fair profit. Unless something is done within the next few months to stabilize conditions, there is great danger of the chaos, now existing in the coal industry, bringing about an upset in all business, which would be very disastrous to the entire country.

It is a time for buyers, producers and miners to do a lot of thinking before it is too late, and not permit anything to happen which may bring about chaotic conditions, generally when we should be enjoying the greatest prosperity in all lines.

Power Transmission

By Horace Bowman, Engineer, Link-Belt Company.

"POWER Transmission"!! What cold facts these two words bring to the minds of most of us. Yet, and as will be related later on in this article, romance creeps in here too.

There are some who will recall the days when a steam engine furnished all of the power to drive machinery, transmitting it through a veritable maze of line shafting, belts and pulleys.

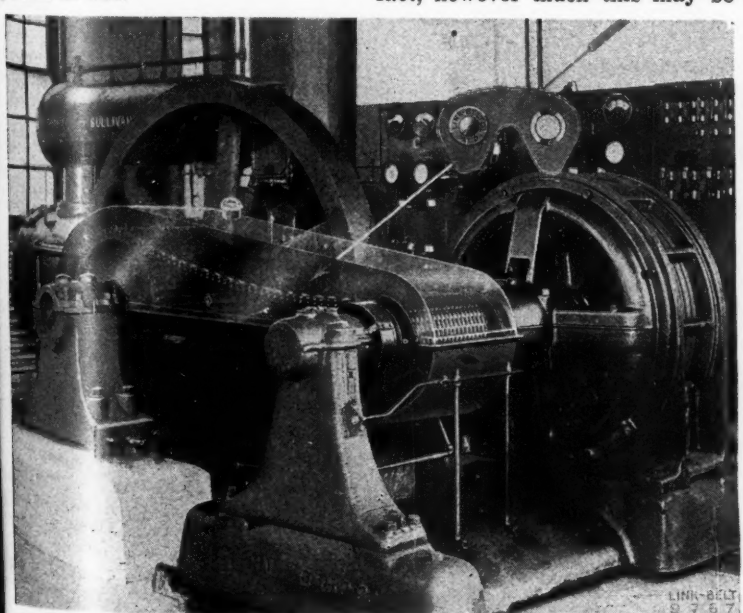
With the introduction of electricity the more flexible motor replaced the steam engine. At first no radical change in the method of driving was made; usually the motor was suspended from the ceiling and hooked up with the line shaft by belts and pulleys.

As the number of motors increased, power costs mounted, so that studies were made to find the best methods of reducing power consumption. It was found that in the large shops the friction loss in belts was as much as sixty per cent. Further study proved that it was more economical to provide certain groups of machines with separate drives; a system which is still very much in use.

The next logical step toward economy was to provide individual drives. This was not done to any great extent, however, until the Silent Chain was invented by Mr. James Mapes Dodge in 1902 and brought to its present state of perfection by the Link-Belt Company.

The economy of the individual drive to the writer is obvious, but inasmuch as the "Individual Drive" vs. the "Group Drive" is being made the subject of debate, it may be well to set forth the advantages of the former method, in this review.

The initial cost of individual motors, silent chains, starting switches and electric wiring may be slightly more than—the line shafting, hanger pulleys, hanger planks, belting and electric wiring necessary for group drive; but the maintenance and depreciation should be considerably less for individual drives. But also weigh in the balance, the convenience with which machines can be placed to obtain the best light for the workman: and to take advantage of the least floor space. That production increases as a direct result of the installation of this method of drive is a proven fact, however much this may be dis-



Silent Chain Driving Compressor at a Quarry.

puted. Should production be needed from one machine it should not be necessary to run three or four others, with the resultant loss of power. Consider also that individual motors will act as a safety device in the event of machine breakage; usually the resultant overload will blow a fuse on the motor, so that instead of three or four machines being down, only the one is out of operation. The cleanliness and perfect lubrication possible with Silent Chain drive is not an item to be forgotten; and to use an old and worn proverb—"Last but not Least," the silent chain drive is as flexible as a belt, as positive as a gear, and more efficient than either.

At the beginning of this article something was said about the romance the title called to mind. It may be of interest to know that modern chain power transmission had its inception in the little town of Belle Plaine, Iowa, not much more than fifty years ago. William Dana Ewart of the firm of Ewart & Gore, owners of the town implement store, conceived the idea of a detachable chain link which could be repaired in the field. Like many good ideas—it came to him in Church. He could hardly wait for the pastor to end his sermon—Ewart knew that he was on the right track for the solving of drive troubles, which had cost farmers untold hours of lost time in the field. That afternoon he took his trusty Barlow, a piece of wood, and began whittling his first crude model for the Idea. Ewart had solved the problem. All the trials and tribulations a young inventor has to meet, were met and overcome by Ewart, with the result that in 1875 the Ewart Manufacturing Company was born. All of this may seem a far cry from the present day problems of power transmission, but it is the beginning, and a part of the romance in back of the convenience and economy of individual silent chain drives, as perfected by the Link Belt Company, who are this year celebrating the fiftieth anniversary of the founding of the Ewart Manufacturing Company, the progenitor of the Link-Belt of today.

The fundamental value of this invention during the fifty years has been and is today of incalculable importance to industry. No important change has been made. It has been the stimulus, however, for the development of the many types of conveyors and power transmission chains. Among these developments; the silent chain ranks high in point of efficiency, adaptability, reliable and economical performance.

It does not need any considerable exploitation.

Silent Chain has an acknowledged place in industry; and a wider field of application will be found as operating engineers study its advantages and possibilities.

Roeper Hoists and Cranes

A NUMBER of new bulletins have recently been issued by Roeper Crane and Hoist Works, Inc., of 1720 North 10th Street, Reading, Pennsylvania.

Catalog Number 50 deals with Roeper Electric Hoists, which according to the introduction have been standardized in every detail, and renewal parts may be had out of stock at any time. These hoists can be arranged for hook suspension from a fixed point, or hung from plain hand geared or motor driven trolleys for operation on a runway beam or overhead single I-Beam track.

Catalog Number 52 deals with Roeper I-beam trolleys and chain hoists. Roeper I-beam trolleys, switches and turntables for overhead handling and conveying of materials are described as simple little machines, whose workmanship is accurate and of high quality, the material of the best obtainable for the work to be performed.

Roeper Electric Type "R" Hoists discusses this type of electric hoist, of spur gear and worm drive. It is said to be extremely practical and simple in design, with few parts of rugged proportion which assure low maintenance cost. All moving parts are completely enclosed and operate in heavy oil or grease.

Roeper Hand Power Traveling Cranes describes the Standard "Roeper" Double I-Beam Crane. The trucks are made of non-breakable all steel construction with reinforcing plates for axle bearings, the bridge either of rolled beams or rivetted plate girders, and furnished with either hand power or "Roeper" spur-geared electric hoists, built in one with all-steel trolley running on its own track on top of the girders.

Texas Highways Grow Apace

County Commissions and Legislature Actively Promote Highway Work To Perfect Unified State System

By Our Dallas Correspondent

BUILDING OPERATIONS in Dallas and other Texas cities continue unabated and the demand for sand and gravel and other building products shows no lessening. Highway construction in all parts of the state is in full swing and many counties and road districts are voting additional bonds for building hard-surface roads. Street paving in all the cities is also under way or being planned, and the call made on gravel pits in the highway construction and street paving is very heavy.

In Dallas the City Commission has ordered about fifty streets paved during the year and contracts covering the various projects are now being awarded. Under the plan for financing paving, the city pays for the paving at street intersections and the property owners pay for the paving in front of their property. By this means, the city is enabled to put down more than $1,000,000 worth of paving with a small bond issue.

Highway construction in Texas is destined to be placed on a firmer basis than heretofore, as the Texas legislature now in session is considering the legislation that will increase the state funds for construction of state highways. A system will be worked out whereby more roads will be built under state supervision, with state funds, which will tend to bring about a unified system of state highways. The state has already taken over the maintenance of state highways, and this is also working toward the unification and centralization of highway construction.

New revenue legislation is also being considered which will increase the tax on motor trucks and motor busses which use the highways most and will tend to reduce the tax on pleasure cars. An effort is being made to equalize the highway costs by placing the larger burden on those who use the highway most.

Litigation involving a bond issue of $150,000 for construction of a concrete highway in District No. 4 of Wilbarger County has been decided in favor of the county and construction of the highway can now go forward. The stretch of road to be paved lies between Vernon and the Wichita County line, and connects a gap between two stretches of concrete pavement on the Colorado-to-the-Gulf Highway.

Fisher County has approved the calling of an election for the purpose of voting bonds for paving the Fort Worth-Roswell highway that extends from Fort Worth westward across West Texas to Roswell, N. M. This is the beginning of a movement looking to the paving of this entire stretch of road, much of which is already improved.

The Commissioners' Court of Jack County awarded contract to the Trimble-Graham Company of Denton, Texas, for improving 12.8 miles of the Jacksboro to Archer City road. This highway is to be of concrete.

Voters of Brown County have rejected a bond issue of $750,000 for building good roads. A new election is to be called and it is believed that the bond issue will be approved.

The Lions Club of Clarendon, Texas, has undertaken to sponsor the paving of the Colorado-to-the-Gulf Highway through the town of Clarendon, a distance of about three miles. Improvement of all highways in Donley County is also sponsored by the organization, and plans are being made for calling an election to vote bonds for building a concrete highway across much of the county.

The Commissioners' Court of Stephens County, sitting at Breckenridge, Texas, has sold the $1,000,000 bond issue recently voted for good roads to H. C. Burt of Houston. The proceeds of the sale will be made available at once for highway construction and contracts are to be awarded calling for the building of more than sixty miles of hard-surfaced roads.

The Commissioners' Court of Kaufman County, Texas, has awarded a contract to J. L. Moore of Kemp for grade of a new highway to the South part of the county. The contract price was $17,575, and a separate contract will then be awarded for surfacing.

The Kaufman County Commissioners also awarded contract for concrete paving on the Dixie Highway to Smith Bros. of Dallas for $2.24 per square yard. The contract calls for a total of $498,109.12, covering an 18-ft. concrete pavement extending for 21 miles through the city of Terrell westward to within one mile of Forney. Work is to be started in April.

Mayor W. H. Goldsmith of Cleburne, Texas, has appointed the following committee to promote street paving projects in the city: John W. Sloore, R. A. Johnson, Vestal Wright, H. T. Ball and Otho Bishop. The city of Texarkana, Ark.-Texas, is completing an extensive street paving program that has called for the expenditure of more than $600,000.

The State Highway Commission has made an emergency appropriation to defray one-haif the cost of graveling a detour on the Bankhead Highway through the town of Caddo Mills, in Hunt County, between Greenville and the Dallas County Line.

Voters of Navarro County, Texas, have been notified that a bond issue of $5,000,000 will be asked for building concrete highways radiating from Corsicana to all parts of the county.

The Commissioners' court of Clay County, sitting at Henrietta, Texas, awarded contract for grading and bridging on the first section of the Colorado-to-the-Gulf highway crossing the county. Clay County some time ago voted bonds for concrete surfacing for the 32 miles of this highway in that county, and the bond issue has been in litigation for more than a year. Proponents of good roads finally won, and the first contract has now been awarded. This contract calls for an outlay of $66,818.35 and covers 9½ miles of highway extending east from Henrietta. Other contracts for grading are to be awarded at once, and the contracts covering concrete surfacing will be awarded as soon as the grade is completed. It is expected that the entire county project will be completed in less than a year.

The city of Nocona, Texas, has awarded contract to Cooke & Cone of Ardmore, Okla., for paving Clay street through the city. The city of Dallas will construct about twenty-five miles of improved highway in Denton County in connection with the construction of the $6,000,000 water reservoir on Denton Creek. The Oak Cliff Cemetery Association of Dallas, Texas, has awarded contract to the Fuller Construction Company for paving driveways through the cemetery.

The city of Dallas, Texas, has recently awarded a number of street paving contracts calling for the laying of several miles of pavement under the street paving project that will call for the expenditure of more than $5,000,000.

The Colorado Sand and Gravel Company has leased a large tract of land near Smithville, Texas, which is underlaid with an extensive bed of sand and good quality gravel. The company will build a spur railroad track for the M-K-T and begin operations on a large scale at once. The sand and gravel taken from the pits will be shipped to all parts of the state.

County Highway Engineers of Texas attending a short course in bituminous pavement construction at the Agricultural and Mechanical College of Texas organized the first association of their history. The organization is known as the Association of County Engineers and it is announced that its purpose is to secure greater economy and higher efficiency in highway construction in Texas. Officers elected are: G. A. Bracher, Washington County, president; T. E. Huffman, Webb County, vice president; A. F. Mitchell, Milam County, secretary.

The declaration of purposes promulgated at the meeting was as follows: Absolute honesty in the awarding and execution of highway contracts, insistence upon full investigation as to location surveys and plans before construction is begun; a more permanent type of roads and discouragement of the policy of building short-time roads with long-time bonds; education of the public to secure engineers of unquestioned fidelity, integrity and proven experience and ability.

Members of the executive committee besides the officers include S. J. Treadaway, Kaufman; M. B. Hodges, Uvalde, and V. R. Smitham, Rockwall. A board of fourteen directors, including representatives from every section of the State, also was elected.

Heil Agency Named

Announcement has been made by The Heil Company of Milwaukee that the Gustav Schaefer Wagon Company of 4166 Lorain Avenue, Cleveland, Ohio, have been appointed distributors for Heil Dump Bodies, Hydro Hoists, and Compartment Truck Tanks in the Cleveland territory. The Gustav Schaefer Wagon Company are very well known for their specialized wood bodies.

Another announcement concerns the appointment of Sid Schultz, 128 East Main Street, Louisville, Kentucky, as distributor of Heil products in the Louisville territory.

Building Figures Look Good

February Passes Last Years Record; Many Sand, Gravel, Cement Operations Increase Capacity, All Active

By Our Memphis Correspondent

THE OPENING of the spring season with a temperature around 60 degrees is the occasion for a revival of road building and out of door construction operations, with a reflected increase in the use of sand, gravel, crushed stone and similar materials. The present sittings of several of the legislative bodies and work through the various highway commissions, the rumors of large improved public parks indicate an extensive and comprehensive plan of development. Building figures in February in most of the larger cities make a fine showing. It begins to look as if 1925 will compare well with and possibly surpass last year, which was one of the best.

The Batesville Gravel and Material Co., at Memphis, with pits at Batesville, Panola county, Miss., reports good spring inquiry on Batesville red quartz, cementing gravel and road and street work particularly promising.

The Wolf River Sand and Gravel Co. of Memphis has been a producer of sand and gravel for 14 years. The deposits in the alluvial river districts contingent to Memphis are among the best in the South. Last year this company doubled its stock and began to electrify its entire plant. They also erected at Crow Creek, near Madison, Ark., a large, modern sand and gravel plant from which more than 1,000 cars of gravel have been shipped in the last six months. In Memphis last season they furnished material for the Auditorium, Hotel Claridge, Catholic Club, Lowenstein's, Columbian Tower Bldg., and other large structures. Large shipments were made to Nashville, Birmingham, Jackson, Miss., and other southern points. V. A. Cordes, president of the company, reports 1925 prospects very bright.

Under recent lettings in Tennessee many fine hard road systems will be built during the spring months in each of the grand divisions. Arkansas and Mississippi in various counties are building a good many roads and the same is true in various sections of Alabama and the parishes of Louisiana. Great improvements are being made in port city Mobile. A bridge in concrete across Lake Ponchartrain, at New Orleans is being provided for.

At Memphis the Memphis Power and Light Co. are to remodel their office building at Madison and Third, and are building for their electrical distribution plant a large concrete and brick warehouse in the vicinity of Beale Ave., and another is contemplated in the northeast part of Memphis.

At Nashville, February permits included a sky-scraper for the Cotton States Life Bldg., a tall building for the Nashville Trust Co.; a five story one for the Life and Casualty Co.; a large apartment house and other structures. The Odd Fellows will also erect an eight story building in Nashville.

The Camden Gravel Co., Memphis, J. C. Ridley, manager, reports better activity in their pits at Camden, Benton county, and spring trade opening up.

The Memphis Stone and Gravel Co. is very active in the Memphis section and in the shipping trade with pits in three states. Mr. Smith, the head of the business, is still active at the head of the Piggly Wiggly interests at Memphis. In these several enterprises he is very busy, but in the gravel and stone business he has a large staff of people in his office. The Allen Gravel Co., Exchange Bldg., reports good March activities in Tishomingo gravel from Mississippi pits. The Pollard Caly Co., Cotton Exchange Bldg., reports good spring activities in clay in the Holly Springs, Miss., section.

Memphis is to have a large glass plant of the Nurre Glass Co. This company operates five big plants, at Bloomington, Ind.; Kansas City, Mo.; Burlington, Iowa; St. Louis, Mo., and Chattanooga, Tenn. The Missouri Portland Cement Co. is building a fine modern sales and warehouse in the business section. The Marquette Cement Co. furnished the cement being used in Hotel Peabody, the structure virtually completed now.

The Norfolk Sand and Gravel Corp., 434 W, York St., Norfolk, Va., are active in the sand and gravel business in the Atlantic coast section and have acquired the plant and properties of the Hampton Roads Sand and Gravel Corp. The Concrete Sand and Gravel Co. of Baton Rouge, La., capital stock $25,000 has been incorporated.

DECLARES COAL HAS NO REAL COMPETITION

WATER and oil will not replace coal as the main source of power and energy in the United States, according to Dr. George Otis Smith, director of the United States Geological Survey.

Dr. Smith told the Engineers' Club here recently that coal will continue as the main source of power and energy in this country as long as the nation lives. He has been director of the Geological Survey since 1907 and has been an authority on natural resources in the United States for twenty-five years.

"My faith is in coal and I believe it will help the people of the world for future ages more than any other product," he said. "At the present time we find that coal represents 65 per cent of products expended each year to produce our energy. Oil and gas represents 22 per cent; wood, 6 per cent; water, 4 per cent, and work animals, 3 per cent.

"Energy produced by mineral fuel and water has trebled since the opening of the present century. In 1880 firewood exceeded coal as an energy producer and in 1850 work animals produced more to help the people of the United States than coal.

"We hear people declare that the scientists will fine a new way to produce power in great quantities through the development of the atom. As a matter of fact, you men, as engineers, know that science has given us more ideas than we can possibly make use of. The scientists who know the most about the atom have the least faith in its qualities for producing great wonders.

"Citizens must deflate their ideas of the possibilities of water power. While it will probably continue forever, it is totally inadequate to supply the needs of the nation and the world, and is now virtually at its highest point of development.

"In Pennsylvania the water power developed 11 per cent of the electrical energy used last year. Yet that was no progress, for five years ago it contributed 16 per cent. These figures are applicable all over the country. So you can see that water power is not keeping up with the procession.

"We are using up oil and gas by the billions of barrels and it is nearly half gone. It was a case of easy come, easy go, and the supply is going rapidly.

"We cannot substitute rainbow resources, such as oil produced from vegetable products, because they would not give us 3 per cent of the power we need. If a bumper crop of corn were reduced to alcohol, and I understand little of it was reduced to alcohol last year, it would not make enough to take the place of gasoline alone.

"The people talk a lot about taking advantage of the sunshine, and I believe the best work the sun ever did for mankind was when it bottled a part of itself up into coal, long ages ago. We must take advantage of this coal and make the best use of it."

Michigan Safety Conference

The Michigan State Safety Conference will be held at Grand Rapids, Michigan, Monday and Tuesday, March 23 and 24, under the joint auspices of the Safety Councils of Grand Rapids, Bay City, Detroit, Lansing, Battle Creek, Jackson and Flint, together with the Grand Rapids Engineering Society, Grand Rapids Association of Commerce, Michigan Department of Labor and Industry, Grand Rapids Passenger Car Dealers Association, the National Metal Trades Association, Grand Rapids Automobile Club, the Furniture Manufacturers Association, Kent County Road Commission, Grand Rapids Department of Public Safety, and the Automotive, Woodworking and Ass. Engineering Sections of the National Safety Council.

H. M. Taliaferro, of the American Seating Company, is the General Chairman of the Arrangements Committee. All meetings will be held at the Hotel Pantlind, the two morning sessions starting at 10:00 a. m., the afternoon sessions at 2 o'clock, luncheons on both days at 12:30 and a dinner meeting on Monday at 6:30 o'clock.

Fire protection will be the general subject for discussion at the morning meeting on the first day; woodworking hazards and hazards in plants handling metals will be discussed at the afternoon session. Accident prevention problems in the public utilities and paper and pulp industries will be discussed at the morning meeting on the second day and the afternoon meeting will be devoted to a discussion of public and school safety.

New Incorporations

The Texas Paving Company of Dallas, Texas, has been organized and charter filed in the office of the Secretary of State at Austin. The company is capitalized at $100,000 and the incorporators are: R. E. Janes, J. S. Barlow and C. W. Janes. The company was organized to take over the street paving work of the Janes Construction Company of Dallas. The Janes Company will continue its work of water and sewer installation.

The West Texas Tile and Brick Company has been organized at Stamford, Texas, with a capital stock of $100,000. Incorporators are: J. H. Payne, E. R. Sturtevant and J. J. Ryan.

The Gonzales Cement Works of Gonzales, Texas, has been organized with capital stock of $400,000. Incorporators are: O. A. Neuman, R. A. Remschel and J. F. Remschel.

The James Stone Company of Richland, Texas, is a recently organized company that will work quarries in the vicinity of Richland. The company is capitalized at $100,000, and the incorporators are: W. S. James, C. R. Wharton and Brade Cole.

The Calaveras Cement Company, Wilmington, Delaware, was recently incorporated for $14,000,000. (Corporation Trust Company of America.)

The Big Bend Quarry Company was recently incorporated at Wilmington, Delaware, for $50,000.

The Thorkote Products Company, Incorporated, was recently incorporated to manufacture asphalt products, etc. Capital, 2,500 shares common stock, no par value. Directors are A. M. Maier, 266 Webster Avenue, Jersey City; A. M. Honohan, Oyster Bay; and F. V. Delavine, 100 Broadway, Manhattan.

The Salado Gravel Company was recently formed at Alamo City, Texas, to exploit a large deposit of natural flint base gravel by P. M. Chuoke, president; A. E. Heilborn, vice-president, and Charles A. Wagner, secretary-treasurer.

The Western Gravel Company has been incorporated at Westfir, Oregon. It will furnish gravel for the Southern Pacific grade.

The Central Gravel Company has been incorporated at Waco, Texas, with capital stock of $39,990 by T. A. Griffin, W. C. Woodlock and R. D. Sterne.

The Albert J. Ward Company, has been incorporated with capital stock of $25,000 to quarry, cut, work, manufacture and seel stone, concrete and lime, by Albert J. Ward, Harold G. Ward and Margaret G. Ward.

The Norfolk Sand and Gravel Corporation of Norfolk, Virginia, has been incorporated with capital of $500,000 and has taken over the plants and properties formerly owned and operated by the Hampton Roads Sand and Gravel Corporation. It is backed by northern and local interests, and will be closely affiliated with The Arundel Corporation and the Richmond Sand and Gravel Corporation.

The Lancaster Sand and Gravel Company of Buffalo, has been incorporated for $25,000 by W. J. Weinard, F. Feltes and H. A. Walter.

The Newport Gravel Corporation of Newport News, Virginia, was recently incorporated for $5,000 to $50,000 by T. B. Clifford, president; O. M. Palmer, secretary; Allen D. Jones, W. J. Neims and L. A. Memurean, all of Newport News.

The East Peoria Sand and Gravel Company of Peoria, Ill., was recently incorporated for $16,000 to handle sand and gravel, and manufacture and deal in concrete products, by John Gibbons, Ethel Fern Gibbons, George G. Ziegele and Marie Ziegele.

The Blackhawk Gravel and Sand Company, Rockford, Illinois, was recently incorporated for $45,000 to conduct a general sand and gravel business, by M. R. Hooghe, J. D. Hooghe and J. W. Huyett.

The Strong Point Crushed Stone Company was recently incorporated at New York City to produce marble, with 2,500 common stock, no par value, by S. R. Rosoff, J. M. Grossman and A. H. Diamant.

The Hudson Stone Company was recently incorporated at Knoxville, Tennessee, with capital of $5,000.

The Duntile System, Buffalo, New York, has been incorporated to manufacture cement blocks, with capital stock of $25,000 by H. C. Hertz, J. J. McKey and G. C. Lippke.

The Hollidaysburg Lime and Stone Company, Incorporated, of Hollidaysburg, Pennsylvania has been incorporated for $170,000 by J. J. Rhodes of Altoona, Pennsylvania.

The Maple Shade Concrete Company of Camden, New Jersey, was recently incorporated for $30,000 by John Poyje of Maple Shade, and Joseph S. Low and Helen Allgaier of Camden.

The Midwestern Sand Company of Columbus, Ohio, has been incorporated for $500 by Emerson L. Laylor and A. M. Kirchner.

The Universal Concrete Products and Gravel Company of South Bend, Indiana, has been incorporated to manufacture, buy and sell building materials, bricks, gravel and concrete blocks, by Harry Polis, Anna Polis, Alex Belkin and Norma Belkin.

The Pine Bluff Concrete Company has recently been organized at Pine Bluff, Arkansas, to manufacture concrete building blocks, artificial stone sills and belt courses.

The Tacoma and Roche Harbor Lime Company of Tacoma, Washington, has changed its headquarters to Roche Harbor and its name to "Roche Harbor Lime and Cement Company."

A completely reorganized cement company is the Yosemite Portland Cement Company of Merced, California, whose new plant at Merced is nearing completion. The capital of the company is $1,500,000. A. Emory Wishon is president.

A corporation headed by William P. Alsip, president of the Alsip Brick, Tile and Lumber Company of Winnipeg, has purchased the Far-West Clay Company's half million dollar plant at Clay City, which cost more than $450,000 to build. The company will manufacture brick and tile only for the present.

Development of marble works in Marble Canyon near Ontario, California, by C. L. Ramirez, is reported. Four families have moved into the canyon and Mr. Ramirez expects to put 50 men to work in six months.

The Ajax Concrete Products Company at Cumberland, Maryland, has secured and is remodeling one unit of the James Clark Distilling Company property at LaVale, preparatory to installing modern machinery for the manufacture of concrete products.

Supervisor Mark Hein of Napa, California, and his brother, J. H. Hein have taken a 20 year lease on the plant of the Basalt Rock Company near Petaluma, and will remodel and enlarge it, spending between $50,000 and $60,000.

United Gypsum Company of Chicago, has increased its stock to $25,000,000.

Charles E. Hollerbaugh and C. G. Brandt, owners of a large stucco plant in Columbus, Ohio, are contemplating the establishment of a similar plant in Tampa, Florida.

The Cedar River Sand and Material Company has changed its name to the Iowa Sand and Gravel Corporation and fixed its capital stock at $100,000. R. E. Smock is president and H. D. Bellamy secretary.

A $300,000 gypsum plant is to be built on Harbor Island, Seattle, Washington, according to Martin Uldall, president and general manager of the Standard Gypsum Company of San Francisco. He stated that the Standard Gypsum Company had purchased the plant of the Pacific Coast Gypsum Company of Tacoma and will transfer it to Seattle.

Vermont Property Leased

Wm. Rockwell, president of the Brandon Rock Products Corporation, has signed a mining lease with Middlebury College, at Middlebury, Vermont. This lease covers a pure statuary white marble property. The ledge is "fractured" by nature, so it is worthless for dimension marble.

Mr. Rockwell expects to erect shortly a suitable plant on this property to produce terrazo, stucco dash, chicken grit, aggregate for cement stone, etc. He may also put in a fine grinding department to produce whiting. The stone analyzes about 98 per cent calcium carbonate so would make a very fine whiting.

The texture of the stone is about the same as "White Carrara" so the product will probably be marketed under the trade name of "American White Carrara."

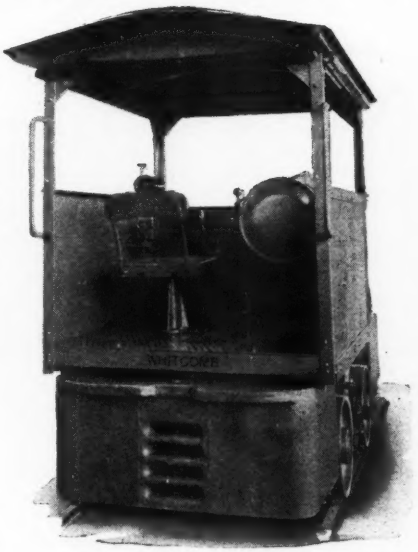
A New Whitcomb Gasoline Locomotive

THE Geo. D. Whitcomb Company of Rochelle, Illinois, has recently brought out a new 4-ton locomotive, known as Model "U.F.-4." This addition to their already large line of industrial locomotives is made to fill a need for a standard 4-ton locomotive to take the place of makeshift types, built over tractors which are built by many plants for their own use. The new "U.F.-4" is built to regular gasoline locomotive specifications, the same as are all Whitcomb Locomotives, the general design and construction being identical with the larger sizes.

The Whitcomb "U.F.-4" is made in all track gauges to meet the various conditions in pits, quarries, mines, road contract work, and industrial plants, and is so made that special variations of the cab for special conditions can easily be arranged. In the standard "U.F.-4," the height over the engine is 54 inches, the height over the cab being 81 inches, the wheel being 36 inches, and the length approximately 9 feet.

The "U.F.-4" is built upon a solid, cast iron chassis, very rugged in design, and the whole unit, in working order, weighs approximately 8,000 pounds with an average draw bar pull of 1,600 pounds. Coil springs are provided on each journal box and effect an easy riding action.

The "U.F.-4" is powered with a 4 cylinder 4¼ by 4½ inch Model S-4 Continental Engine, fitted with a Dixie magneto and impulse starter. This engine is rated from 30 to 40 H.P. at 1,200 R.P.M. and from 45 to 48 H.P. at 1,800 R.P.M.



Rear View of Locomotive.

In designing this type, (the "U.F.-4") particular attention was given to the cab arrangement with especial thought as to the operator's comfort and safety. There are no exposed drives and the cab is provided with a leather seat, all pedals and levers being within easy reach. The radiator is of the special artillery type made with removable sections which in case of damage may be easily replaced, or which may be filled with a solid core if new sections are not available. The coupling device is so arranged as to allow for coupler heights 9½, 12½, 15½, and 18½ inches, which, as a whole, take care of all standard cars.

The entire job is attractively finished in a gray waterproof paint and it looks like a real haulage machine

The New 4-Ton Whitcomb Gasolene Locomotive.

that is capable of doing any job which its rating promises.

New Republic 3-ton Truck

A NEW improvement in Republic motor truck construction is announced with the introduction of the new Republic model 19 truck, third series, three tons capacity. This model which is said to bristle with vital improvements in design and construction, succeeds the model 19, second series. Considerable improvement in appearance and more sturdy build throughout are reported, and it is said the approval of both dealers and owners alike has been registered.

One striking development is the newly designed radiator, which has an increased frontal area of about 60 square inches. Another big improvement is the new type, clear-vision cab, which is roomy and comfortable, with ample leg room for operating the brake and clutch pedals. The driver's seat is divided so that the gasoline tank can be filled without removing the seat, the gas filter spout extending up between the two sections of cushions. The tool compartment is beneath the seat. The cab's close fitting joints make it absolutely weatherproof and there are sliding storm curtains in the doors, which are extremely wide. A visor protects the driver's eyes from the sun, and a special spring mounting relieves stresses set up by frame flexing.

The strength of the entire chassis has been greatly increased by a greater depth of frame. There is a tie bar between the rear spring brackets, which does not replace the shackle bolt as in ordinary construction but has its own points of application. This permits use of standard high carbon heat treated bolts for shackle. The new steering gear is a recently developed truck type of latest design, which can easily be removed because of the convenient location and simple construction of the frame bracket.

The service brake is mounted on the front propeller shaft at the center bearing support. Pressure feed lubrication to all working parts of the motor insures efficiency and long life.

Bay City Crane-Excavators

Two new bulletins just off the press are announced by the Bay City Dredge Works, Bay City, Michigan, describing the Bay City Model 16-B Convertible Crane-Excavator.

Bulletin Number 20 illustrates the use of the 16-B Bay City with combination crane and trench attachments on a difficult piece of sewer construction in Brooklyn, New York. This machine which "at 12 o'clock may be used as a ditcher and at 1:30 a crane," is used for the following operations: Skimmer, Ditcher, Shovel, Crane, Dragline and Piledriver. The illustration shows the 16-B Bay City with combination Crane and Trench attachments on a difficult piece of sewer work in New York City.

Bulletin Number 21 covers the 16-B with its different buckets including Skimmer, Trencher, Shovel and Clamshell. The Skimmer Scoop has ¾ yard capacity, 45-50 cubic yards per hour; the Ditcher Scoop has ⅝ yard capacity and digs 20 feet deep; the Shovel Dipper has ¾ yard capacity, digging 50 to 70 yards per hour; and the Crane, with 30 or 40 foot booms, operates Clam Shell Bucket, Orange Peel Bucket, or Dragline Bucket. This machine is described as the popular excavator for Highway Contractors, Sewer Contractors, General Contractors and General Utility work.

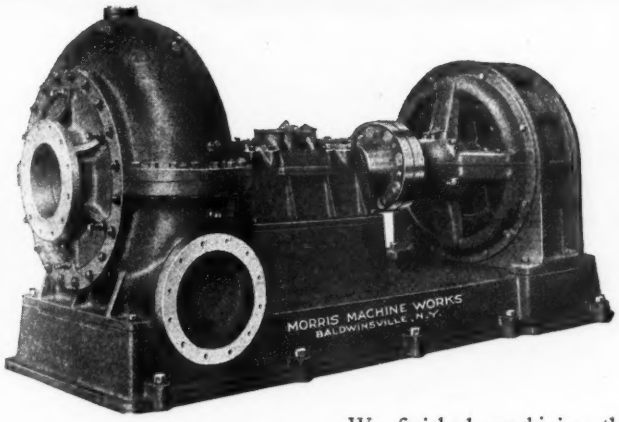
A New Link-Belt Book

The many uses to which the Skip Hoist method of handling materials may be effectively applied are interestingly set forth in the text matter and illustrations of a new publication *Book Number 546*, just issued by the Link-Belt Company, manufacturers of elevating, conveying and power transmission equipment. The text matter gives complete details of operation, capacity, design and construction, fully explains the function of the Skip Hoist and tells where and on what classes of work it is profitably used.

The illustrations supplement the text where the text alone is insufficient for clear understanding. Copies of *Book Number 546* may be had on request to the Philadelphia, Indianapolis or Chicago offices.

Falk-Bibby Flexible Coupling

An attractive bulletin on Falk-Biddy Flexible Couplings, Bulletin Number 35, has been issued by The Falk Corporation of Milwaukee, Wisconsin.



Service plus:

ACCIDENT can cause breakdown or temporary stoppage of any machinery, no matter how good, so it pays to buy from a builder that can *and will* help out in an emergency.

The Morris Machine Works is particularly conscientious and in this respect is always ready.

For instance—The Reppelier Coal Co., Minersville, Pa., phoned us one Friday morning that there were 34 ft. of water and limited pumping facilities in their mine—that if we could send a new rotating element, they could put an old Morris Centrifugal Pump into service. All they asked was quick delivery to a transportation company.

We finished machining the new element shortly after midnight, and at 1:00 a. m. a Morris erecting man who knew the pump was started in an automobile with the new part. This man drove the rest of the night, went through a 60-mile detour, met a guide at Wilkesbarre by appointment and completed the trip by train. On arrival Saturday our man found everything swimming. He worked almost continuously until 2:00 a. m. Sunday, when the pump went into commission.

Jas. S. Pierce, assistant to the president, will vouch for the keen interest we took in seeing that the pump was put into operation at the earliest possible moment.

If you like this kind of service as well as the best pumping equipment that money can buy, we want to serve you.

Write for Bulletin No. 20

Tell us your needs or at least ask for Bulletin 20.

Morris Machine Works **Baldwinsville, N. Y.**

Originators of Centrifugal pumps, both single and multi-stage, and builders for practically all purposes since 1864

Branch Offices: New York, 39-41 Cortlandt St.; Philadelphia, Forest Bldg.; Cleveland, Engineers' Bldg.; Chicago, 217 N. Jefferson St.; Boston, 79 Milk St.; Pittsburgh, 320 Second Ave.; Detroit, Penobscot Bldg.; Charlotte, Realty Bldg.; Richmond, 708 Mutual Bldg.; Houston, 119 Main St.

Sales Representatives: Buffalo, St. Paul, Kansas City, Denver, Salt Lake City, Seattle, Portland, Ore.; Los Angeles, New Orleans.

MORRIS
CENTRIFUGAL PUMPS

Peerless Cement Company Detroit Plant to Have Large Portable Tripper

THE Stearns Conveyor Company, material handling and equipment manufacturers of Cleveland, have just completed and shipped to the Peerless Portland Cement Company of Detroit one of the largest portable trippers of the kind ever built. It is to be used in connection with the cement firms operations in the Michigan city and also on jobs to be cared for at their plant now being erected in Detroit.

The tripper is of steel frame, with a 54-inch by 610-inch long belt equipment of Stearns design. The tripper will handle 2,500 pounds of crushed stone per hour, according to Earl Stearns, president of the conveyor company. The machine is driven by enclosed cut tooth gears. It provides an innovation in this style of equipment which insures starting and stopping without jar, through the use of a clutch of the automobile type. The tripper is of the automatic, self propelling and reversing type. Special brushes have been provided on this job for the cement people, so that there is no danger of damp crushed stone accumulating on the belt or in any way doing damage to the machine.

The Stearns people are preparing other special equipment which will be used in the new three million dollar cement plant at Detroit and will be one factor in providing what is asserted the most modern plant of its kind in the United States.

Hoppin and Company New Bulletin

"H and H" Enameling Furnaces are described in a new bulletin just issued by C. A. Hoppin and Company, Inc., Engineers and Contractors of Central National Bank Building, Peoria, Ill. This furnace for Oil or Gas Fuel, is Intermittent Fired and Recuperator Equipped. It is built for use in the Ceramic Industry.

Several features of design and construction are described which constitute a distinct departure from and improvement over, the old type of intermittent fired enameling furnace.

"H and H" Equipment and Service include the following: Intermittent Enameling Furnaces, Muffle Enameling Furnaces, Stationary and Portable Smelters, Continuous Annealing and Scaling Furnaces, Charging Forks, Automatic Temperature Control, Pyrometer Equipment, Complete Fuel Systems, etc.

The Stearns Tripper Ready to Leave.

End